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ALLOY STEELS AND IRONS—BRIGHT SPOT ON THE HORIZON

By RICHARD TULL

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CHECKING back into history one can readily trace the development of modern steel making from pig iron, through various transitory stages to wrought iron and finally carbon steel. The discovery of a suitable process for making ordinary low-carbon steel was one of the greatest boons that the industrial world has ever received. But as demands upon steel became more exacting, the Bessemer process, the acid and basic open-hearth processes, the crucible, and finally the electric furnace methods were instituted to further meet the needs of manufacturers for better steels.

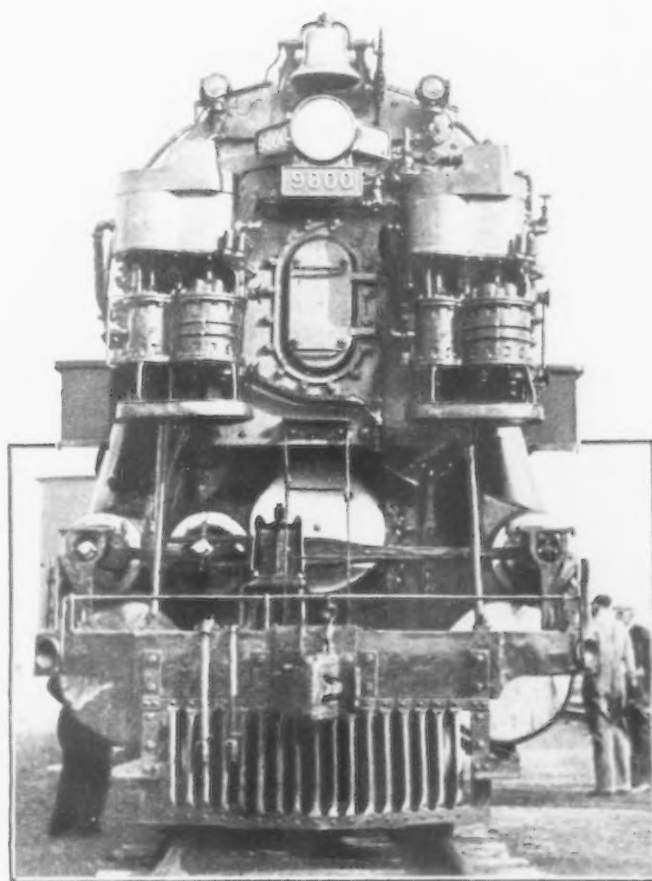
However, plain carbon steel early in the twentieth century had practically reached its limit of application, so the metallurgists cast about in search of something to add to steel to impart to it superior physical properties. As a result, the alloy steel industry began its career. And it is still in its infancy,

for only in the past few years since the World War have producers and designers considered the substitution of alloy steel parts for those made of carbon

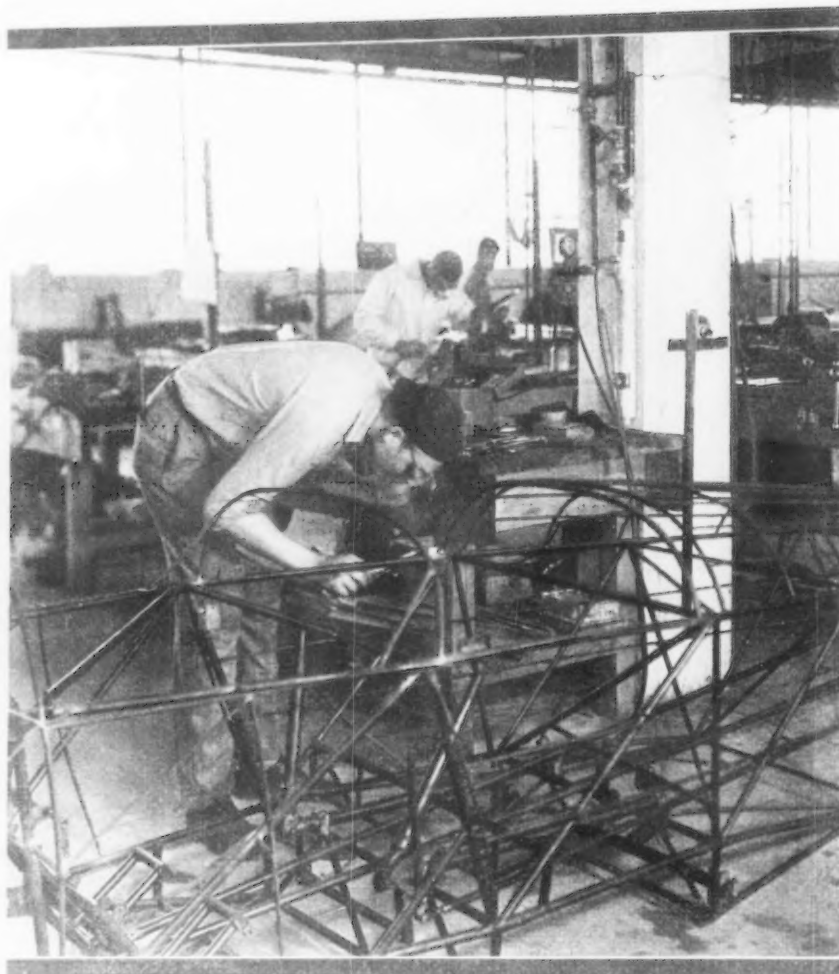
steel and iron as standard practice instead of something to be used in special cases only.

As early as 1882, Robert Hadfield, of Sheffield, England, developed manganese steel which was tougher, harder when cold worked, more resistant to abrasive wear, and stronger than ordinary steel. In some uses it outlasted the latter three or four times. The great difficulty lay in the trouble encountered in machining which, until the advent of tungsten-carbide milling and cutting tools, was considered impossible. This property for many years partially arrested the development of this alloy but, in spite of this, high-manganese steel is being used widely for parts subject to excessive wear.

The first application of chromium and



Alloy steels have eliminated tons of dead weight in this monster.



Airplane frame of chrome-molybdenum steel tubing.

nickel in steel was found about 1900 when it was used in ordnance steel for armor plate and armor-piercing projectiles. The introduction of nickel and chromium into both steel and cast iron imparted to them characteristics heretofore considered impossible. Chromium in cast iron refines the grain structure and raises the percentage of combined carbon in the iron. The presence of nickel tends to distribute the combined carbon uniformly throughout the casting, and, in addition, toughens the matrix of the metal. A combination of the two elements increases the hardness, strength and wear resistance of a casting. With limited amounts of nickel and chromium the metal is machinable. It also has the tendency to decrease warping and cracking in manufacture and service.

These two alloys, when used in steel, give it properties that vary with the amount of the material used. Steels having a nickel content of about 1.75 per cent and a chromium content of about 0.80 per cent are tough and have high strength. By raising these percentages slightly, parts particularly well adapted for oil and case-hardening are produced. Steels and irons containing 18 per cent of chromium and 8 per cent nickel are known as stainless or rustless irons and steels. They resist ordinary oxidation and atmospheric corrosion, have high strength even at elevated temperatures, and will take a high polish that is permanent.

Chrome-molybdenum steel furnishes great

strength, especially when heat treated. Chrome-vanadium in steel gives it greater resiliency, longer life, higher strength, and greater resistance to impact.

Salient Features of Alloy Steels

ALL this leads to the salient features presented through the use of alloy steels. Past experiments and experience have shown that, with these alloys, it is possible to obtain increased strength, greater rigidity and stamina with light weight; and multiplied resistance to wear, corrosion, heat, acids, shock and fatigue. And the greatest result of all is economy of operation resulting from longer life, and fewer breakdowns and repairs. At present practically every field of production has found applications in which alloy steels have proved or are proving far superior to carbon steel.

In the aircraft industry chrome-molybdenum steel tubing is used practically throughout the plane because of the high strengths possible with no increase, in fact with a decrease, in weight. Locomotive frames and parts are made from nickel and vanadium steels which allow the elimination of thousands of

pounds of dead weight. Large machine blocks and castings are now manufactured of nickel and chrome-nickel cast iron, which eliminates much of the unnecessary bulkiness of the parts, formerly made from ordinary gray iron castings.

The properties of chrome-vanadium steel render it particularly well adapted to use for locomotive springs and side frames, automobile springs, chassis, and running gear. Car axles and all parts subjected to se-



Manganese steel lengthens the life of this huge crusher.



This manganese steel shovel bites out 12½ cu. yd. at a clip.

vere fatigue or reverse stresses are giving longer service when vanadium steels are used.

High Percentage Chromium or Manganese Steels

CRUSHER parts, steam shovels, buckets, sand pumps, gears, pinions, tractor treads—in fact, many parts subject to heavy wear are now made of steel containing high percentages of chromium or manganese. Chromium steel rails are now being used to resist the terrific wear encountered on railroad curves and to give greater strength. It has been found that alloy steels, specially designed to resist abrasion, outlast ordinary steel many times over, resulting in a saving that more than balances the higher initial cost.

In the cast iron fields, automobile engine manufacturers have found that chrome-nickel cylinder blocks, exhaust manifold headers, brake drums, etc., will resist abrasion far better than ordinary iron, and yet are readily machinable. Valve seats do not "hammer-in," and cylinder bores do not become pitted as quickly in alloy cylinder blocks.

PRESENT uses of alloy steel are but the forerunners of the innumerable applications not yet born.

All alloy steels have been developed with but one aim in view—economy.

Rustless steel in architecture has made possible the elimination of many tons of stone work and masonry.

Hadfield manganese steel, introduced in 1882 and probably the first alloy steel, has many valuable properties.

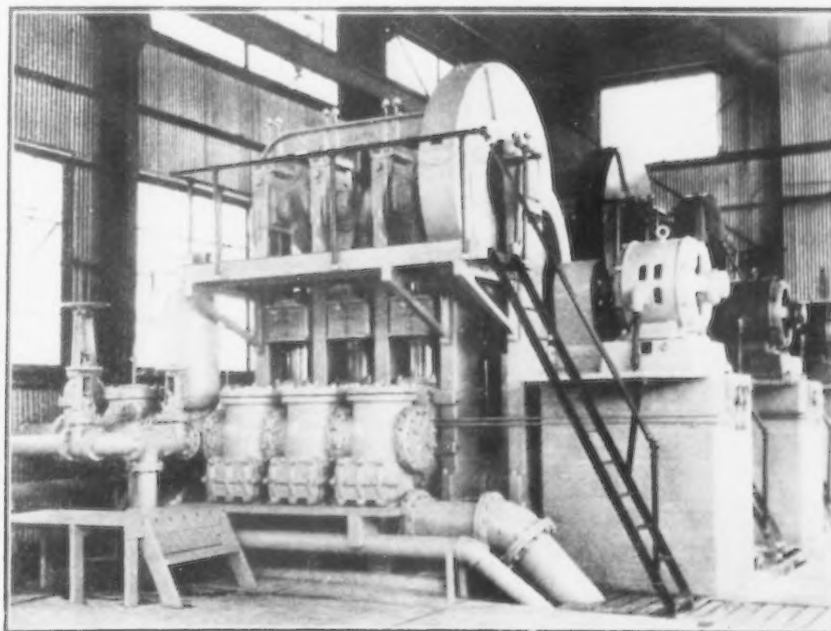
Many alloy steels and irons are cited in this article and their applications described in general.

The extremes of temperature encountered in exhaust manifolds do not cause warping and cracking if chromium and nickel are added to the iron.

Chrome-nickel steel is being used where strength at high temperatures is desirable. Firebox sheets and arch tubes in locomotives last longer and are stronger when this alloy is employed. Chrome-nickel baffles in water tube boilers give longer service than the old type of refractory brick baffle and, at the same time, are easier to install and repair. Exhaust pipes for airplane engines are being made from chrome-nickel steel and welded to the manifolds.

Rustless Steels in Industry

RECENTLY in the structural fields, "18-8" chrome-nickel steel has been introduced for trim. The gleaming Chrysler Tower and Empire State Building
(Continued on page 527)



Dependability of these pumps is assured by alloy steels.

Investigating Vibration Troubles in the Field

By PETER DAVEY

is President
of the New York

MANY field balancing jobs are simple and may be done in a few hours; others call for weeks of effort, sometimes without results. Vibrations caused by electrical unbalance, faulty bearings, shifting weights, loose couplings, foundation troubles, etc., may be very misleading, and jobs involving weeks of fruitless effort in attempting to correct such conditions by means of balance weights are not uncommon.

The few balancing jobs described in this article were selected because of one or more features that made them especially difficult. The balancing and diagnostic work was carried out with the Davey portable balancing equipment described in *THE IRON AGE* of Feb. 28, 1929, page 610.

This equipment utilizes the stroboscopic principle both in the case of the rotary and the vibratory motions, and ascertains the relations of these motions to each other. It includes a "breaker head," by means of which the light flashes may be regulated so that

they occur once every revolution; through a graduated "phase adjuster" in the head the flashes may be made to occur at any position in the revolution. Another major unit in the equipment is the "vibrometer" (Fig. 2) which, placed in contact with the vibrating machine, not only indicates the amount of vibration but also the position of the frame in its vibratory path with respect to that of the rotor in its revolution.

Fig. 1 shows the application of this equipment in balancing a motor generator set. The man in the foreground is applying the breaker head of the instrument to the end of the shaft, while the man in the background is observing the rotating shaft with the neon hand lamp. Chalk numbers from 1 to 12 were marked around the end of the commutator; these could be read comfortably by the operator with the hand lamp no matter how fast the shaft rotated, because the neon tube in the hand lamp makes one flash per revolution, thus making it possible to view the rotating part in any position. Suppose the hand lamp reveals the rotating part apparently standing still with number 12 at the top; then if the operator turns the phase adjuster through 180 deg., the rotating part will next be seen stationary with number 12 at the bottom.

The vibrometer unit of the equipment is shown in Figs. 1 and 2. In Fig. 1 it is resting on the metal blocks, with its contact pin against the bearing pedestal of the machine. The vibration amplitude will be indicated by the range of oscillation of a beam of white light on the ground glass scale, which is graduated in thousandths of an inch, the actual vibration being magnified about 500 times. Because of the speed of oscillation, the white beam will appear as a continuous band of light.

A second neon tube located within the vibrometer is also controlled by the breaker head so that it flashes once per revolution, that is to say, once per complete oscillation of the white beam. The flashing of this tube throws a narrow beam of red light on the ground glass scale, just above the white



Fig. 2.—Placed in contact with the vibrating machine, this instrument indicates both the amount and source of vibration.

▲ ▲ ▲

LOCATING of unbalance through its effects—vibrations—is described in this article. The field diagnoses and cures outlined by Mr. Davey concern both high and low-speed machinery installed and at work in factories, power plants and steamships. Portable balancing equipment utilizing the stroboscopic principle for checking both the rotary and vibratory motions was used in this work.

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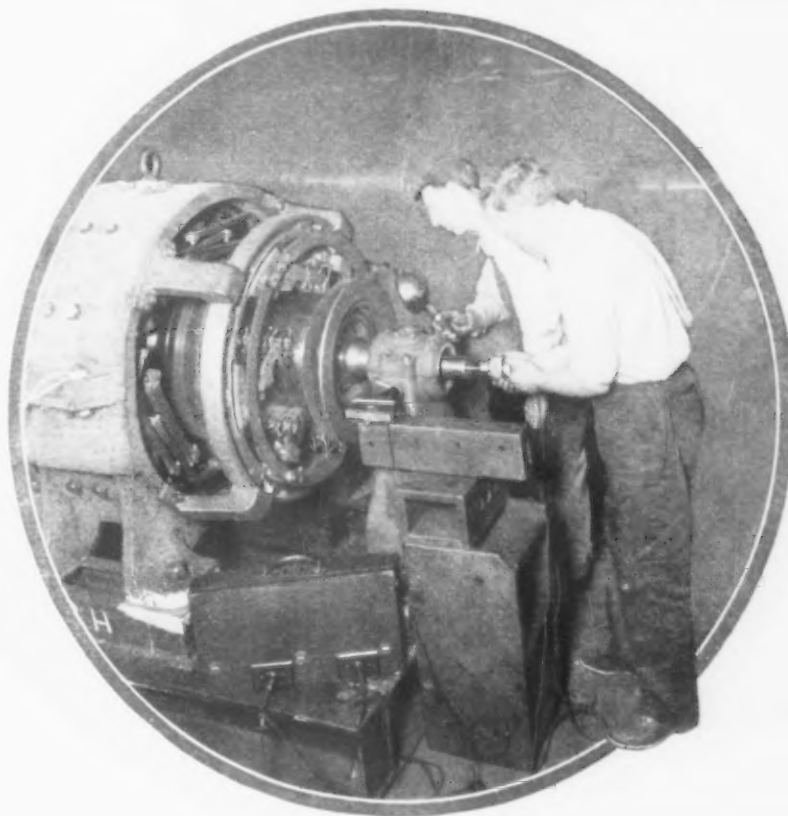


Fig. 1.—Portable balancing equipment applied to motor generator set.

light band. By turning the phase adjuster on the breaker head, the neon tube will flash at different points in the cycle, and the red beam will appear at different points above the white band. Thus by noting the position of the red beam, and then by noting the position of the numbers on the rotating part, the operator can see at once the relation between the vibratory and rotary motions.

The appearance of the light beam in the ground glass scale, when the operator has turned the phase adjuster to bring the red beam to the extreme right, is shown in Fig. 3. With this setting, the hand lamp is switched on, and the number on the rotating part which appears on the side adjacent to the vibrometer indicates the true position of the high spot, that is, the spot that is thrown over toward the vibrometer with each revolution of the unbalanced armature.

Balancing a Motor for a Ventilating Set

The balancing of a motor for a ventilating set developing 175 hp. at 5200 r.p.m. showed strikingly that unbalance could be responsible for excessive heat and high power consumption, in addition to annoying vibrations. This motor had been through a balancing machine but after assembly in its bearings, it had been found unsafe to operate it in excess of 2000 r.p.m. The portable balancing equipment described was used for a preliminary balancing test, the motor being run at 1800 r.p.m.

The light beams on the vibrometer scale showed instantly that it was useless to attempt balancing operations because of a chattering and inconsistent high-spot reading, as shown in Fig. 4. Obviously, this

was caused by loose bearings. On inquiring into the bearing clearances, it was found that these were almost 50 per cent over normal. The excessive clearance had been found necessary because the temperature rise at the bearings was 80 deg. C. on light load at 1800 r.p.m., when the specification called for a maximum of 40 deg. C. at full load. This necessitated frequent changing of oil, but it was decided to tighten up the bearings to normal clearance and risk a short run. The vibrometer reading then showed a clearly defined white light band, with a steady red beam, illustrated in Fig. 3, indicating plainly that all bearing trouble had disappeared, and only a condition of pure unbalance remained.

Application of a counterbalancing weight at the point indicated immediately decreased the vibration amplitude on the next run; at the same time the temperature rise was less than before, in spite of tighter bearings. As the vibration condition was improved, the balancing speed was raised, until it became safe to run at 5200 r.p.m., and with each improvement the bearing temperature dropped, until the final rise was under 40 deg. C. At the same time it was noted that the light load driving current dropped 25 per cent, clearly indicating the amount of energy which was being wasted by the unbalanced condition.

Steamship Vibrations Corrected

The two main turbo-alternators of an electrically-driven liner called for an unusually accurate balance, and the time for completing the work was limited to the four days that the ship was in port.

These units operated at 2800 r.p.m., and although

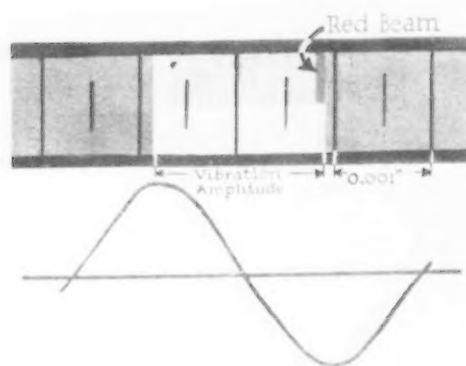


Fig. 3.—Appearance of light beams on vibrometer scale in case of straight mechanical unbalance. The white beam is uninterrupted and the red beam is stationary.

they did not appear to be very much out of balance, showing maximum vibration amplitudes of only about 0.0017 in., they were the cause of severe vibrations in some of the cabins three decks higher up. The couplings between the turbines and alternators were selected for numbering, and numbers from 1 to 12 were marked around their peripheries with white chalk. The breaker head was driven from the governor ends of the turbines, the instrument being held in the hand as shown in Fig. 2. Alternate readings were taken on the port and starboard turbines, and at each point the white light bands on the vibrometer scale were continuous and sharply defined, and the red beams stood still where set, as shown in Fig. 3, indicating clearly that the vibrations were of "sine wave" form, caused by unbalance alone.

During the first run of each unit, the following information had been gained: (1) All vibration caused directly by unbalance; (2) accurate vibration amplitudes at two ends and each side of the center bearing; (3) accurate high spots at two ends and each side of center bearing; and (4) close estimate of angle of lag at turbine side of center bearing.

To measure the angle of lag, the behavior of the red light beam on the vibrometer scale was observed while the machines were coasting down after shutting off the steam.

Starting with the red beam at the extreme right of the white band, in each case it commenced to move over toward the left almost immediately the machine commenced to slow down, moving not quite to the extreme left before the machine came to rest. From this indication, the angle of lag on each unit was estimated at 150 deg. If the angle of lag had been zero the red beam would have remained on the right during the slowing down, and if it had been 180 deg. a complete shift over from right to left would have been indicated on the ground glass scale.

Assuming the angle of lag as 150 deg., the first weights on each unit were placed 30 deg. behind the high spots, and in each case a decrease in vibration amplitude resulted, but while the port unit showed the same high spot on the next run, indicating that the high spot estimate was correct, the high spot on the starboard unit moved slightly forward, indicating that

the angle of lag had been underestimated. The second estimate on the starboard unit was 160 deg., which proved to be correct. A check on angle of lag was made at the other bearing during subsequent runs and it was found to be the same all along the machines. The vibration in the cabins became almost imperceptible.

Low-Speed Hydroelectric Job

In the case of a 17,000-kw. vertical hydroelectric unit having a 125-ton rotor running at 165 r.p.m., only one day was available for the balancing work. Since this was a low speed job, it was necessary to isolate the vibrometer from the vibrations. This was done by suspending a wooden board by rope slings from the overhead crane, and weighting it down with a sand bag. The breaker head was driven from the top of the shaft.

During the first run, amplitude and high-spot readings were taken at various points, starting at the floor level and working up. A compound vibration was shown by the white light band, which was streaky in appearance, as shown in Fig. 5, but the position of the red beam was not affected, so it was diagnosed as a 25-cycle electrical vibration superimposed upon the low-speed vibration due to unbalance. The high-spot readings were the same at all points, but vibration amplitudes increased steadily to a maximum of 0.005 in. at the top of the machine, indicating the probability of unbalance at the top. A point in line with the top bearing was therefore chosen for checking the angle of lag while the machine was slowing down.

Starting with the red beam set at the extreme right of the white band, it persisted at the right as the machine commenced to slow down, finally moving slightly toward the center before the machine came to rest. The angle of lag was therefore estimated at 35 deg., and a large test weight was placed 35 deg. ahead of the point opposite the high spot.

The second run showed a slight decrease in vibration amplitude, but the high spot had moved slightly forward in the revolution, showing that the angle of lag had been underestimated. The original weight was therefore advanced 10 deg. and another one added at the same point, resulting in a big decrease of amplitude, and the same high-spot reading on the third run, showing that 45 deg. was the correct lag angle. Weights which finally amounted to some hundreds of pounds were placed at the same point, and the machine was perfectly balanced, showing an amplitude of only 0.0004 in. It is interesting to note that the 25-cycle vibration decreased as the balance was improved, showing that it was due to the effect of unbalance on the air gap, until it finally disappeared completely.

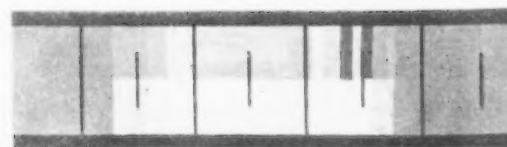


Fig. 4.—In balancing a motor, this vibrometer reading indicated excessive bearing clearance.

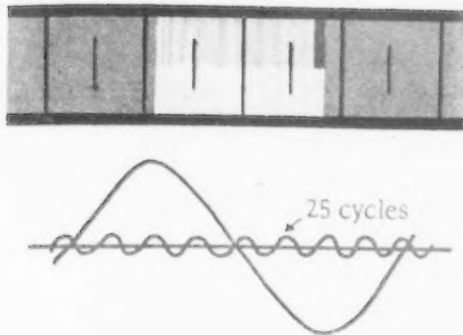


Fig. 5.—Mechanical unbalance plus electrical vibration, causing white streaks across the white band.

The balancing of a high-speed turbo-blower showed immediately, from the behavior of the red light beam, why previous efforts at balancing had been unsuccessful. After overhauling, unbalance had developed in the turbine end, the vibration amplitude increasing all the way up to the operating speed (8500 r.p.m.) and reaching a maximum of about 0.008 in. After the first run, when checking the angle of lag, the red beam starting from the right was observed to move rapidly across the scale toward the center, finishing its movement at the center. This showed that the angle of lag was 90 deg. and that the machine was, therefore, operating at its critical speed. Furthermore, rapid movement of the beam indicated that the foundation had considerable resilience. It was obvious, therefore, that the machine would be sensitive to very small changes of weight, and this proved to be the solution of the problem, the corrections being made by drilling small holes in the wheels, and in the final stages, by countersinking some of these holes.

This was an unexpected condition, because the first critical speed is generally very much lower than this. But it was accounted for by the unusually heavy construction of the spindle, which was machined out of the solid with the wheels.

Electrical unbalance is frequently encountered in units driven by induction motors, particularly of the two-pole type. It is often inherent in the design, and cannot be cured in the field. But when such unbalance exists coincidentally with mechanical unbalance, it is important to know exactly how much there is of each condition, so that the mechanical unbalance may be corrected, after which no time need be wasted in trying to effect further improvement.

When electrical unbalance alone is present a continuous light band of approximately sine wave characteristic will appear on the ground glass scale; its electrical origin will be instantly recognized by the behavior of the red beam, which instead of standing still will oscillate rhythmically to and fro at slip frequency, because the vibration frequency and the flashing of the neon tube are out of step.

Distorted ball and roller bearings will occasionally produce vibrations which cannot be corrected by balancing. The characteristic vibration often seen in these cases is of the form shown in Fig. 6. Experience to date has shown no remedy but to change the bearing.

Any shifting weight in a rotating member can be recognized instantly by studying the behavior of the red light beam, because the latter will not stand still within the white band. The wave form of any vibration which is not of "sine wave" character can be easily plotted on cross-section paper. This is done by turning the phase adjuster in steps of, say, 10 deg. at a time, and plotting displacement of the red beam against degrees. This is sometimes valuable in determining the cause of troublesome vibration.

Welded Drums for Navy Boilers

TWENTY-FOUR boilers being built by the Babcock & Wilcox Co. for new 10,000-ton cruisers for the United States Navy are having their drums welded. It is reported that the Bureau of Engineering, Navy Department, has adopted a definite and rigid testing procedure for determining the physical properties and soundness of the finished welded joints. The welded seams are to be given a non-destructive examination by means of X-rays, and the finished welded drums are to have exhaustive hydrostatic tests.

Minimum ultimate strength of the welded joints on tension test is specified by the Navy Department at 65,000 lb. to the sq. in. Against this, some of the joints made by the Babcock & Wilcox process run as high as 74,500 lb., with the minimum at 65,000 lb. and an average of 67,500 lb. On the bend test the percentage of elongation of the outside fibers is specified as not less than 30. The same welds referred to above showed a minimum of 40 per cent elongation, running to a maximum of 65 and an average of 50. Similarly, with the Charpy impact test, where the specification is 20 ft.-lb., this minimum has been met, but the average has gone far beyond it, to 28 ft.-lb., with a maximum as high as 45 ft.-lb.

It is reported that the Bureau of Engineering, in its adoption of fusion welding and the specifications applying thereto, regards the matter of welding as no longer one of empirical shop practice. It is, on the other hand, a process capable of scientific control, with results which are susceptible to being checked and proved by tests which have been shown to be trustworthy.

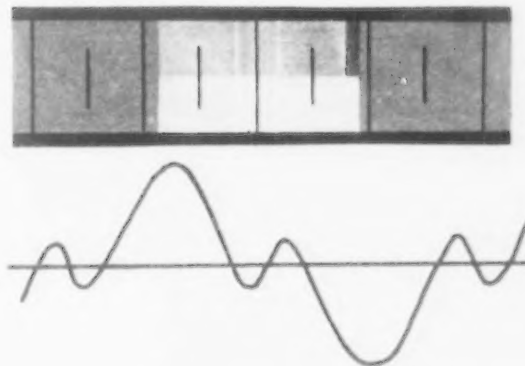
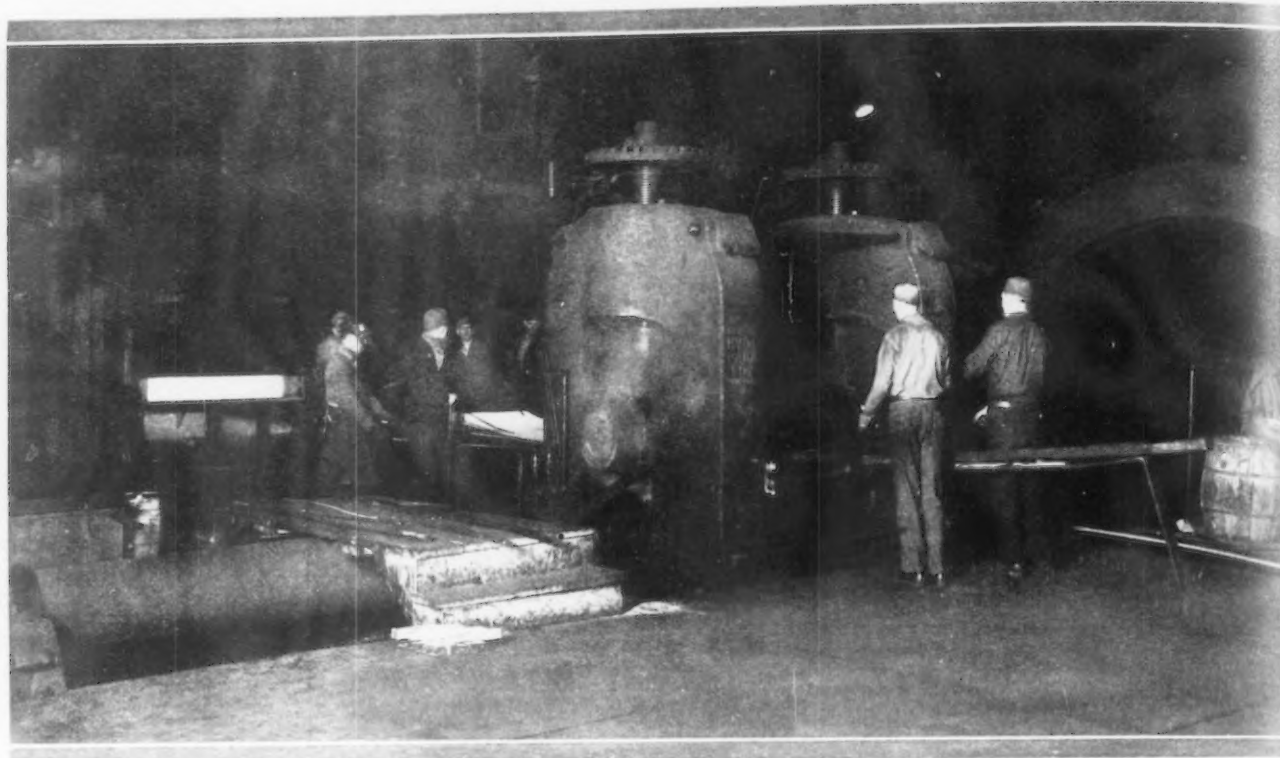
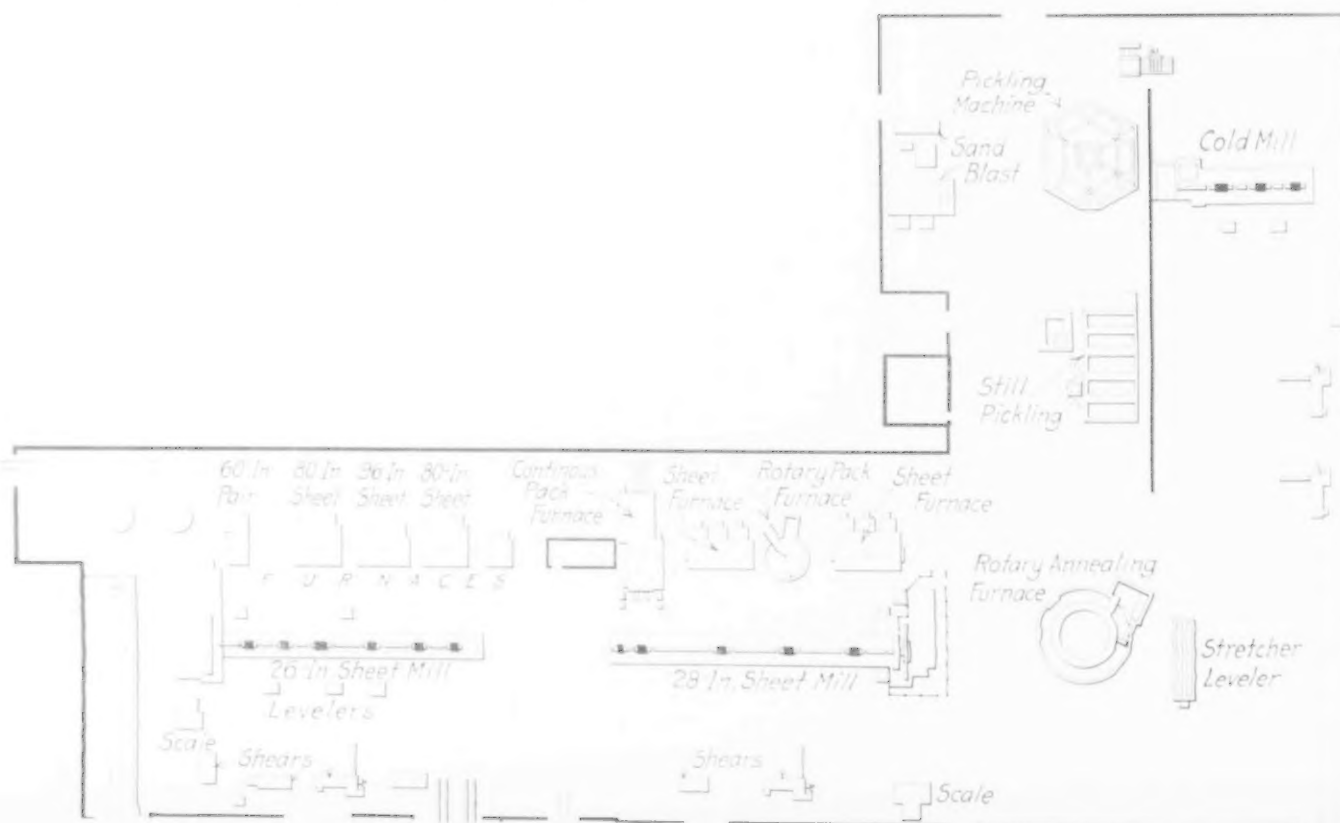


Fig. 6.—Characteristic vibration produced by defective ball or roller bearing.



NEW SHEET MILL AT PARK WORKS, CRUCIBLE STEEL CO. OF AMERICA

In the hot mills (above) considerable care is taken to prevent warping and bending. General layout below shows how the material is fed through furnaces to rolls and thence to shears.



Making Corrosion-Resisting Sheets With Polished Surface

By T. H. GERKEN

Pittsburgh editor, *The Iron Age*

CLOSE control of all the processes in making and finishing steel sheets is relied upon in the Park Works to give a product of the highest quality. The new mill for making corrosion-resisting sheets is served by rotary-hearth furnaces for both pack heating and normalizing. In the normalizing furnace the sheets rest upon rider sheets and there is no opportunity for their becoming scratched. This same care to preserve an excellent surface is maintained throughout the finishing departments.

DESIGNED exclusively for rolling special-analysis and, especially, corrosion-resisting steel sheets, a new mill recently placed in operation at Park Works, Pittsburgh, of the Crucible Steel Co. of America, contains a number of innovations in heating and annealing equipment, as well as other features not frequently encountered in sheet mill practice.

Prior to the building of the new mill, sheet capacity at Park Works consisted of six stands of hot mills, three sheet furnaces, one pair furnace, four sets of shears and supplementary equipment. In making the new installation the old mill building was lengthened and two additional wings, parallel to each other and at right angles to the main building, were added. The addition not only provided ample space for existing equipment, but also prepared facilities for future expansion to meet the growing demand for corrosion-resisting steel sheets, of which the Crucible company is a large maker.

ORDINARY carbon steel sheets will not be rolled in this mill. With the exception of special furnaces for heating and annealing, required because of the high uniformity of structure demanded, the mill differs from ordinary installations principally in the facilities offered for the careful handling and finishing of the product.

Wooden blocks have been installed for the movement of material over the shears, and throughout the entire operation lifting rather than dragging is employed, to avoid scratching and bending. Special sand-blasting and grinding equipment is included and

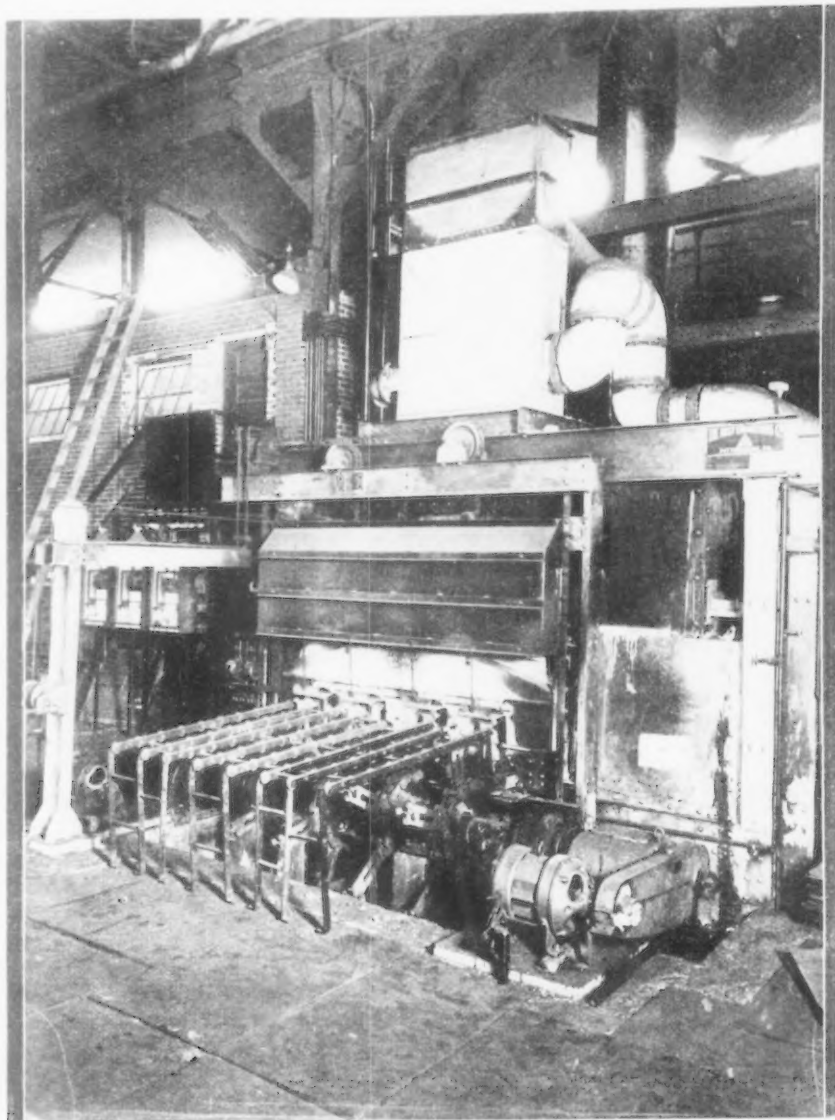
present capacity for polishing will be increased by special equipment now being built.

Sheet bars from a nearby unit are delivered into the pickling and sand-blasting room, as shown in the layout diagram, by means of an overhead crane. Here they may be either pickled and rinsed or transferred to the other side of the building for sand-blasting and grinding.

Bars are then removed to the main building for heating preparatory to rolling in the hot mills, located directly in front of the furnaces. The old bar heating and sheet furnaces are near the end of the mill adjacent to the earlier installation of hot mills, while the new furnace installation, which forms one of the interesting features of the mill, is nearer to the receiving wing.

Pack Furnace Heats to 2000 Deg.

A CONTINUOUS pack-heating furnace, installed by the Rust Engineering Co., Pittsburgh, was designed and constructed specifically for corrosion-resisting steel packs, requiring a temperature 500 to 600 deg. higher than in an ordinary pack furnace. It is generally operated at 1900 to 2000 deg. F., and special construction features have been embodied to provide flame circulation and consequent uniform heating. The furnace is 35 ft. long and 8 ft. wide and contains four lines of alloy steel carriers. These have a maximum speed of 60 ft. a minute and are operated by push button control. Two drives are provided, with two separate material roads through the furnace. The carrier flights are $\frac{3}{4}$ in. in thickness, as com-

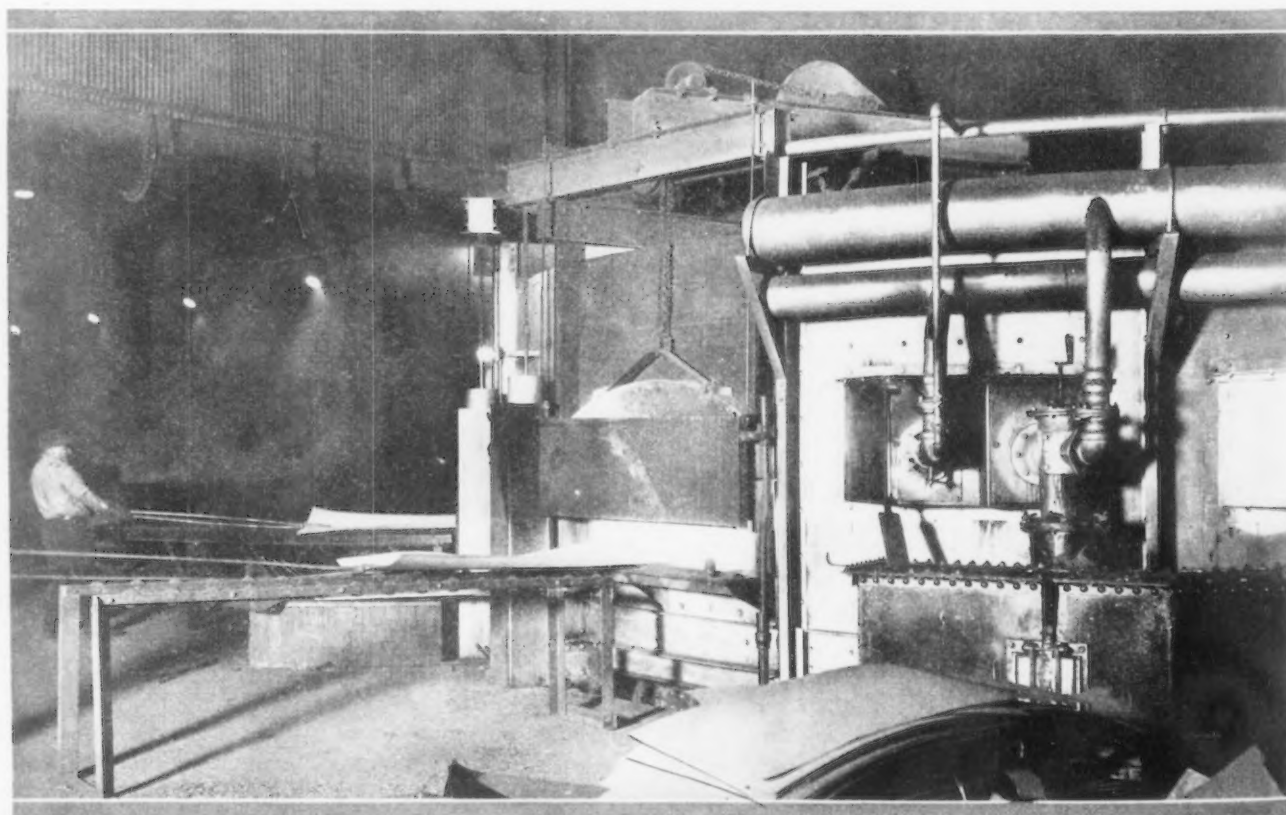


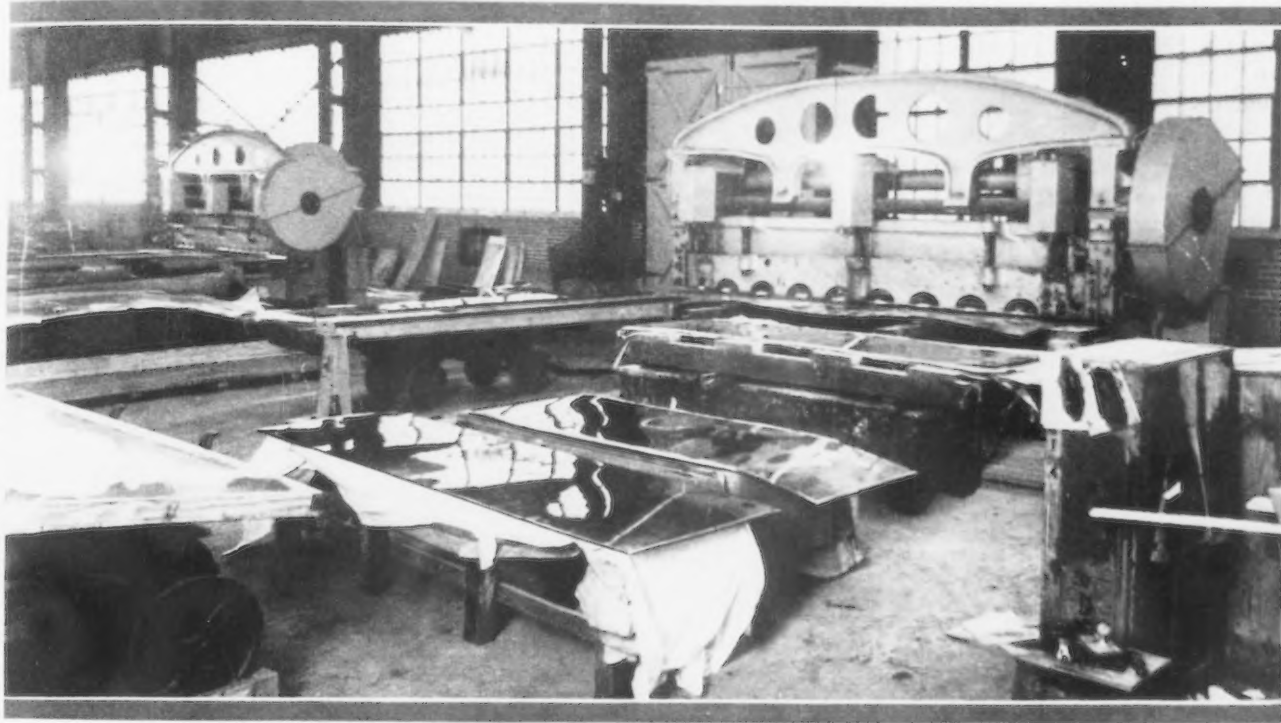
AT the discharge end of the continuous pack-heating furnace (left), the door is equipped with four slots through which the carrier blades emerge when the door is closed. When the door is opened the slots are automatically closed, to assure a maximum of closed space in the furnace.

THE finished sheets shown in front of the shears in the shipping room (right) are highly polished and are inspected and packed with great care.

CHARGING sheets into the rotary normalizing furnace (below) is accomplished by means of a simple charging rack. Refractory piers are provided in the furnace. In background a normalized sheet is being withdrawn.

WOODEN platforms in front of the cold rolls (lower right) are among the many precautions taken to avoid scratching sheets during manufacture.



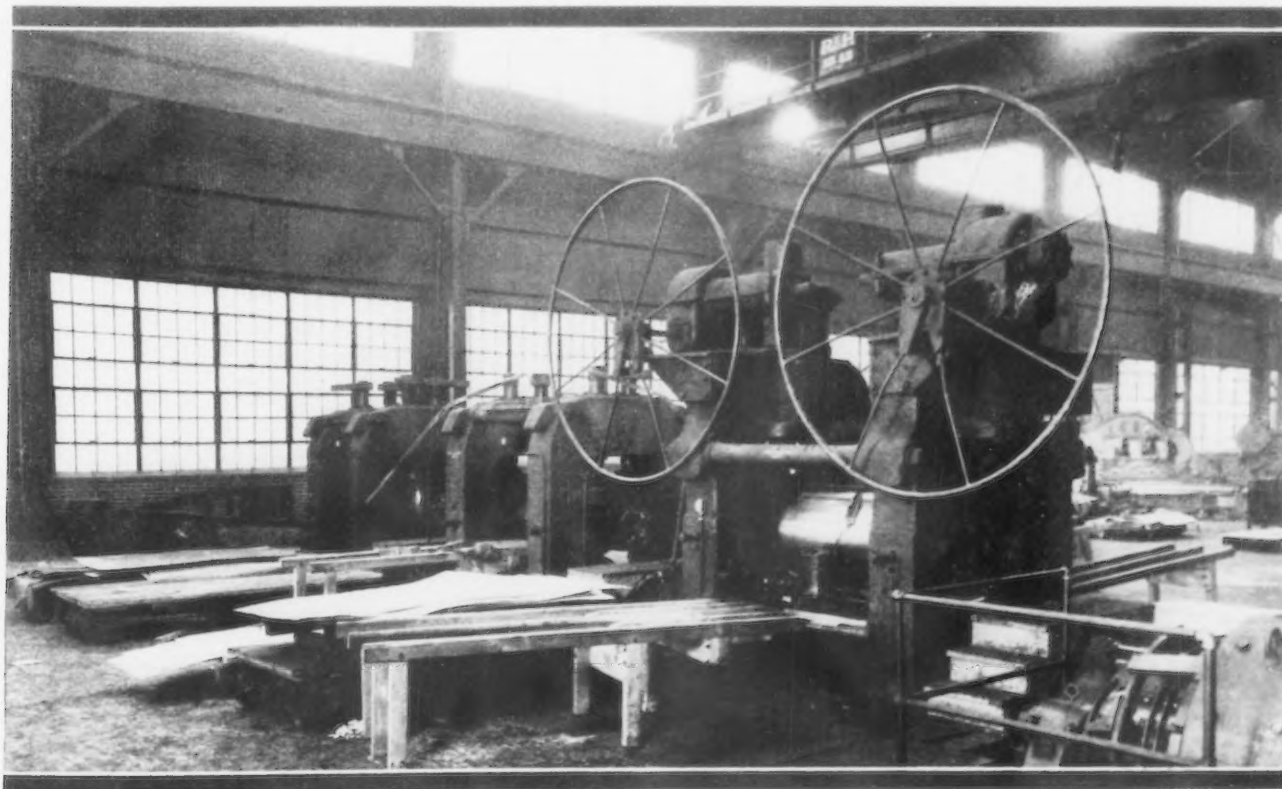


pared with the usual $\frac{3}{8}$ -in. size, and refractory inserts are provided to prevent possible damage to the sheets by contact with rough edges.

A recuperator, shown on top of the pack furnace, is equipped with a special safety valve on the air line to prevent the air from ever being cut off. Because of the high temperature maintained in the furnace, air must be blown through at all times, to prevent the recuperator from burning up. Hence a balance valve is provided, which is set for a certain temperature

and which is automatically adjusted to maintain balance upon a change of pressure. A system of indicating lights keeps check on the recuperator temperature.

Efficient flame circulation, which is essential to the uniform heating of the entire pack when moving through the furnace, is aided by waste gas ducts at both charging and discharging ends of the furnace. These ducts at the discharge end also provide better working conditions than might be expected if waste



gases were allowed to pass out through the door. A special temperature-control pyrometer operates the air valve at the discharge end of the furnace, the amount of air determining the gas required to maintain the heat. Flame circulation control in the furnace is also bettered by means of directional air jets, in the side of the furnace adjacent to the bridge wall, which direct flame travel in the furnace.

A delicate system of control at the discharge end of the furnace has been arranged, to maintain the temperature of the packs until they are removed from the furnace, and thus allow cooling to begin simultaneously in the entire pack. The discharge door is operated by an air cylinder and the door is opened and the packs are discharged at the same time.

This door is equipped with slots through which the carrier blades emerge. These slots are covered by swinging alloy plates so hinged and regulated that they close when the door is opened to discharge packs, and which open when the door is closed, to permit the carrier-blade chain to pass through. This assures a maximum amount of closed space in the furnace at all times and is essential to proper temperature control.

Sheet Furnaces Individually Controlled

TWO batteries of sheet furnaces adjacent to the pack-heating furnaces are fired by Duquesne burners with producer gas as fuel. The three units of the first battery are $5\frac{1}{2} \times 10$ ft., while the second battery of the same number of furnaces is made up of $5\frac{1}{2} \times 14$ ft. units.

Each chamber is individually controlled with regard to both gas and air, and all have hoods over the discharge doors to provide better working conditions. Temperatures up to 2000 deg. F. are ordinarily maintained. One of the longer furnaces is equipped with a special compartment at the rear with a door on the side where rough-downs and plates may be heated.

Pair Furnace of Rotary Type

SEPARATING the two batteries of sheet furnaces is a producer-gas-fired rotary-hearth type pair furnace for heating sheet bars, built by the Electric Furnace Co., Salem, Ohio. This furnace is equipped with two motor-operated doors approximately 45 deg. apart. The bars are manually charged through a door at the left on to refractory piers and travel clockwise on a rotating hearth through the furnace, and are discharged through a door at the right. Rotation of the hearth is intermittent and under the direct control of the operator by means of push buttons. Push buttons also control the doors which may be closed between the charging and discharging operations.

Producer-gas burners arranged around the outer periphery of the furnace shell fire tangentially into the furnace chamber above in such a manner that the gases are given a rolling action, completely covering the furnace hearth and circulating around and through the work. The vents are arranged at the hearth level, the principal venting means being through the outer furnace walls by means of vertical flues which carry the products of combustion to the atmosphere. The furnace is 17 ft. 8 in. in diameter and will accommo-

date 19 pairs of $33 \times 10\frac{1}{2}$ -in. sheet bars at one time. Its rated capacity is 62 pairs an hour, or an hourly total of 3600 lb. heated to 2150 deg. F.

Rotary Pickling Operation

Directly in front of the new furnace installation are four stands of hot mills, from which sheets are moved to shears on the opposite side of the buildings. Two sets are provided. Sheets are then carried back into the receiving wing for pickling and scrubbing prior to cold rolling. A special rotary pickling tank has been provided. Equipped with five arms, it enables material to be treated with three different acids without rehandling. Four other pickling tanks and one rinsing receptacle are included in the layout in this room.

Normalizing Furnace Minimizes Handling

NORMALIZING is carried on in a special designed furnace of the gas-fired rotary-hearth type, also built by the Electric Furnace Co., and especially for stainless steel sheets. In this furnace the sheets are not carried through the furnace on rolls, bars or beams, as in the customary type of sheet normalizer, but are placed directly on waster sheets on piers on the rotating hearth. Here they remain, in the same position on the hearth, during the entire treatment and travel through the furnace. This practically eliminates any possibility of scratching. The waster sheets are supported on brickwork and carry only the weight of the sheet being normalized. They also remain permanently on the hearth, carrying no heat out of the furnace and requiring no labor for placing or removing from the furnace.

The furnace doors are approximately 45 deg. apart and sheets to be treated are charged into the furnace by hand through the right door with a simple charging rack. After completing the circuit of the furnace chamber, material is removed through the left-hand discharge door. The doors are motor-operated by push-button control.

Hearth drive consists of a motor, speed reducer, gearing and a ratchet-and-pawl device operating on the bottom of the rotating hearth. The hearth is so arranged as to advance at each move a distance corresponding to the angle between the adjacent piers. This causes the hearth to stop, each time a sheet is opposite the doorway. The doors then open automatically. The speed of the hearth may be varied to provide a heating time in the furnace of from 2 to 8 minutes.

The furnace is provided with burners for both producer and natural gas, which fire tangentially into the furnace chamber in a manner similar to the firing of the pair furnace. Vents are also similarly placed, and the quantity of producer gas burned is fixed and control effected by varying the amount of natural gas burned. The furnace lends itself readily to atmospheric control, which will provide the desired type of atmosphere at the will of the operator. The unit is equipped with two heating zones, each automatically controlled, and will handle 72 tons of 9 ft. x 3 ft. sheets a day, at a temperature of 2100 deg. F.

(Concluded on page 527)

REPRESENTATIVE TESTS OF ELECTRIC WELDED STEEL PIPE

WHILE the usual tests, such as hydrostatic and crushing, are sufficient for the protection of the buyer in routine pipe production, the accompanying photographs illustrate how electric welded pipe manufactured by the Republic Steel Corp., Youngstown, meets practical requirements for ductility. The tensile test, shown in Fig. 1, was made with a $\frac{1}{4}$ -in. notch at the weld. The bending and vanstoning tests, shown in Figs. 2 and 3, are carried out in accordance with regular shop practice. Figs. 4, 5 and 6 might be termed "abuse tests" and illustrate the strength of the electric weld. All the photographs were taken of actual tests from regular production pipe.

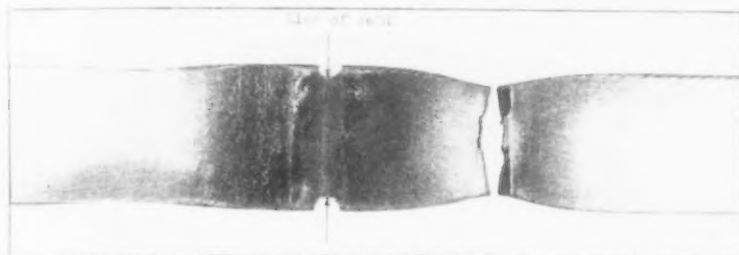


Fig. 1—Tensile test with $\frac{1}{4}$ -in. diameter notch at the weld.



Fig. 2—Bending and oxy-acetylene welding of electric welded pipe as carried out according to regular shop practice



Fig. 3—Vanstoning quality of electric welded pipe, $6\frac{1}{2}$ in. O.D. x 0.250 in.



Fig. 4—Ductility tests on electric welded pipe, $6\frac{5}{8}$ in. O.D. x 0.218 in. Twist test with weld longitudinal through center. Upper photograph is pipe $13\frac{1}{16}$ in. wide, given seven twists; lower is pipe $1\frac{1}{2}$ in. wide, given four twists.



Fig. 6—Ductility tests on electric welded pipe. Pipe A is $5\frac{3}{4}$ in. x 0.165 in. thick, expanded to $7\frac{7}{8}$ in. Pipe B is $5\frac{3}{4}$ in. x 0.125 in. thick, expanded to $7\frac{3}{4}$ in. Pipe C is $5\frac{1}{2}$ in. x 0.275 in. thick, expanded to $7\frac{9}{16}$ in.

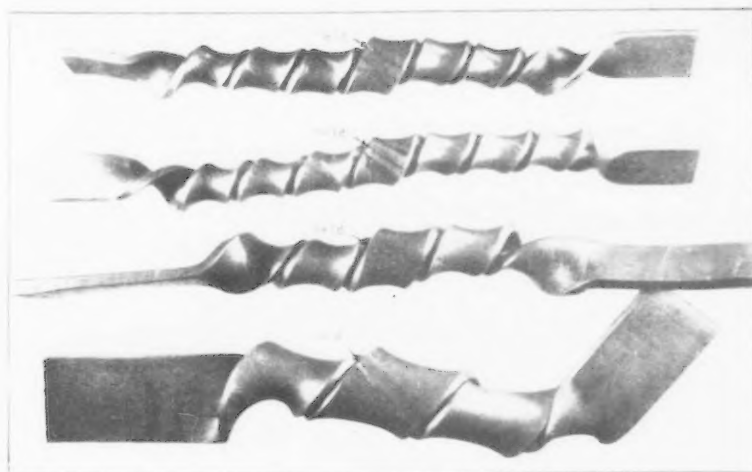
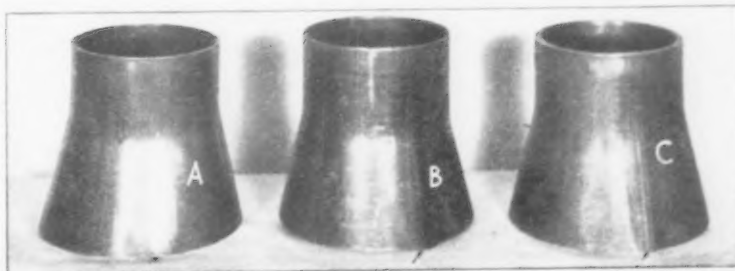


Fig. 5—Ductility tests on electric welded pipe. Twist test with weld at right angles to axis of test strip. Two upper photographs are pipe $6\frac{5}{8}$ in. O.D. x 0.218 in.; two lower are $6\frac{5}{8}$ in. pipe O.D. x 0.250 in.



Heat-Treating Equipment

By R. A. MILLHOLLAND

REPUTATION of a small plant is guarded if the parts entering its products are properly heat treated.

Good heat treatment will cover many faults in design but poor heat treatment will cause the best designs to fail miserably.

Furnaces, pyrometry, quenching medium and tank, and carburizing material and equipment are the four major factors which control the quality of heat treatment.

Correct temperature reading is as essential as uniform temperature in heating.

Design of an inexpensive carburizing pot is offered by the author.

ONE of the surest ways for any small plant to build up a reputation is to produce a product that has been properly heat treated.

The manner in which the steels in a given tool, part or machine have been hardened and tempered is a matter of concern to the user. Consider how much real satisfaction is derived from the possession of a pocket knife which has a wonderfully tempered blade.

Without doubt the quickest way for any plant to lose its reputation is to turn out a product which quickly fails in service because the steels have been abused in the fires. A machine clutch that shatters after the first week in production, or a shaft that snaps at the first strain will give the customer a lasting disgust for the whole machine that will stay with him as long as it is in the place.

Good heat treatment will cover up many faults of design, but poor heat treatment will cause the best designs to fail miserably, to the discredit of the designer and maker as well. To be able to have good heat treatment consistently and maintain a reputation for high quality, the equipment used must be such that uniform results can be obtained. This equipment need not be expensive.

There are four major factors which control the quality of heat-treated parts. Each shall be discussed as a separate subject. They are:

1. Furnaces
2. Pyrometry
3. Quenching medium and tank
4. Carburizing material and equipment.

The scope of this paper does not cover the various formulæ and processes for different steels. It concerns itself with the equipment or tools of the art. Every steel maker will gladly give to the trade correct instructions for heat treating each brand of steel.

A steel of given analysis will react to a given heat treatment in exactly the same way each time the process is used. Uniform results can only be obtained with a furnace which heats the steel to the correct temperature and at a uniform temperature throughout the mass. Uniform heating is the best preventive for distortion or warping of steel when quenched.

To obtain uniform temperature the furnace must be constructed with that object in mind. There must be some means provided for regulating the heating chamber so that colder portions can be increased in temperature and the hotter area brought down to lower temperatures.

A variation of 50 deg. Fahr. in the four corners of a small furnace may result in the loss of an expensive die or the production of a quantity of smaller parts which may get out into the hands of the customer either too hard or too soft.

Whether the furnace is fired by gas, fuel oil, coke or other means, the combustion space should have openings or ports that can be throttled to regulate the distribution of heat uniformly throughout the heating chamber area. In the single burner furnace of small size, this regulation of temperature is done by partially covering the heating ports with small

for the Small Plant

sections of refractory tile which are cemented in place, once the proper adjustment has been found. In multiple-burner furnaces the uniformity of temperature distribution is controlled by manipulation of the burner adjustments.

Two Grades of Furnace Construction

Practically all furnace builders produce an excellent small furnace.

There are two distinct grades of furnace construction, classified as the intermittent service type and the continuous or heavy-duty type furnace. The latter are only used in large production plants operating on a two or three-shift schedule. For the average plant the less expensive construction will do very well unless fuel cost is high and the increased fuel economy of the more expensive furnace shows an attractive saving.

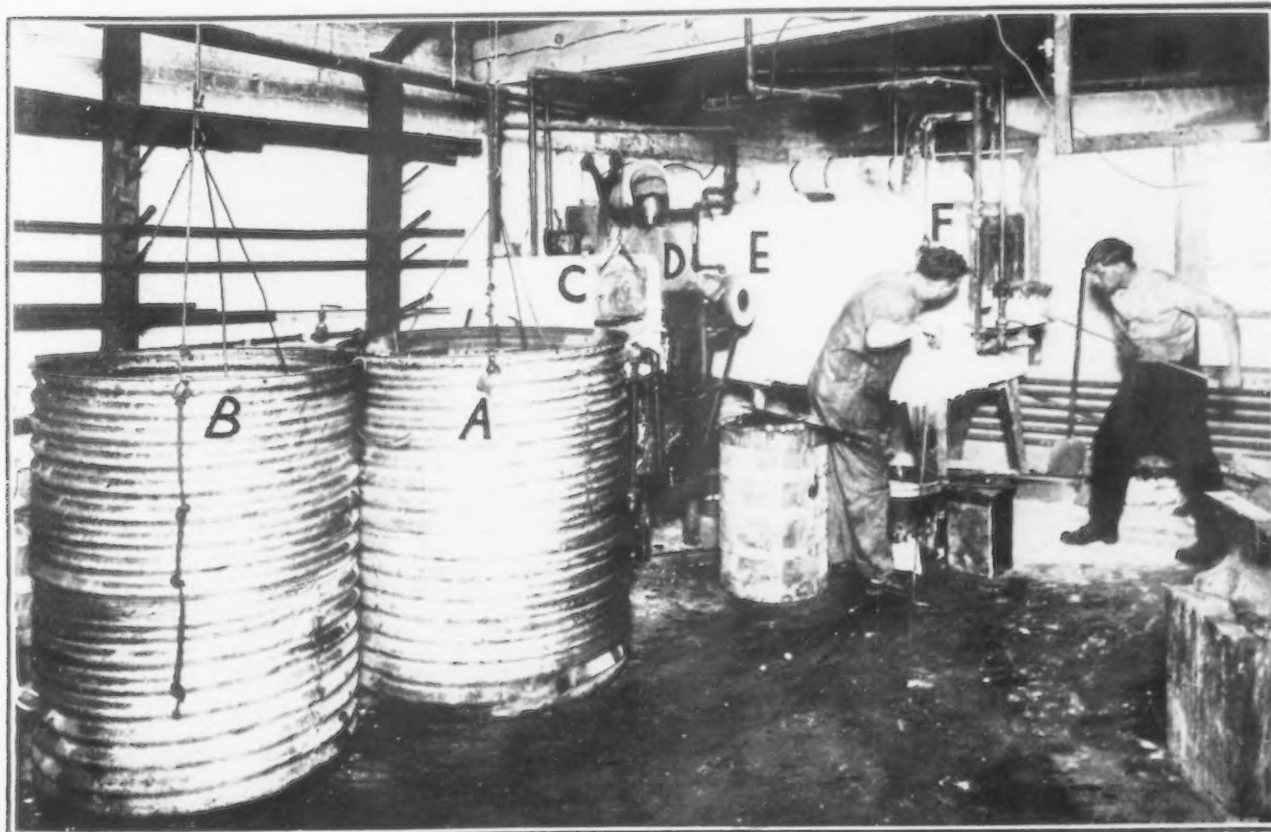
Insist that the furnace have a snug-fitting door. This detail of furnace design has a great deal more

to do with successful operation than is generally understood. A loose-fitting door will cause a furnace to heat non-uniformly, to waste fuel at an alarming rate and to upset the chemical activity of the furnace atmosphere, possibly changing it from a reducing atmosphere, so desired when heating a die, to one of an oxidizing nature which would pit and scale the work so badly that the result would be a total loss.

One illustration shows a small heat-treating department consisting of:

- One carburizing furnace, 18 x 24 x 48 in. (F).
- One reheating furnace, 10 x 12 x 18 in. (C).
- One cyanide and lead pot furnace with hood (D).
- One barrel-type furnace for high-speed steel and forging tools.
- One water-jacketed oil quenching tank.
- One water-quenching tank.

The outside of these furnaces and the exhaust gas pipe are insulated with a 4-in. thick coat of

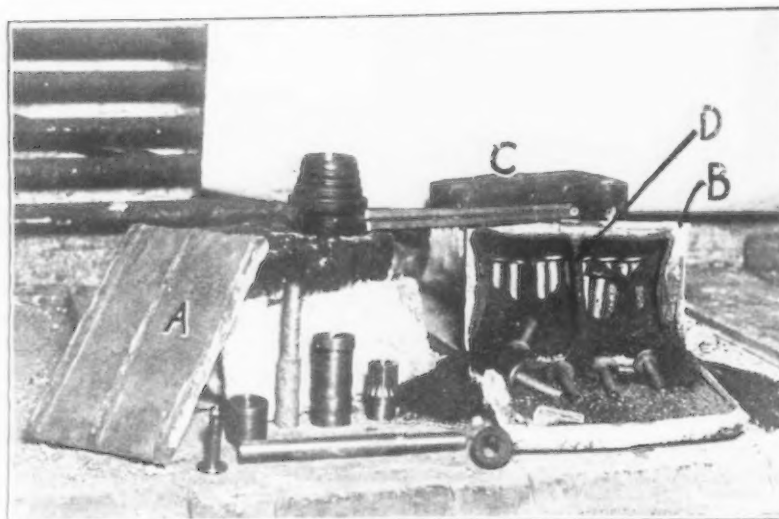


A small heat-treating department equipped with four types of furnaces and with two quenching tanks.

boiler insulation. This was done for two reasons: Due to the low head room, the radiated heat is so intense that the automatic sprinkler heads periodically burst and caused damage; also the insurance inspectors requested that this work be done, as the furnaces were operating in a wooden building.

In this particular case the insulation of the outside of these furnaces and some minor alterations on the furnace doors effected a fuel saving of more than \$50 a month.

The results obtained from this small group of furnaces were highly satisfactory. Steel mills and other large plants sent specimens to be heat treated in order to check results and conditions elsewhere. The



Design of a carburizing pot which is not expensive. It has a long record of number of hours under heat.

set-up was widely copied both in this country and abroad.

Selection of Fuels Limited

The choice of fuels for furnaces is limited. In a multiple-story building of mill construction, gas is the logical fuel to use. Ground floor installations can use fuel oil without difficulty and in most cases the cost will be less. This is a matter of local conditions. Localities where natural gas is available seldom use fuel oil in the smaller installations of furnaces.

Some of the finest results obtainable are secured from electric furnaces. From a comparative standpoint these furnaces are expensive in first cost and the fuel cost is higher than for gas or oil, but for uniformly high standard of output the electric furnace is certainly a pleasure to operate.

Reliable Temperature Measuring Necessary

Measuring of high temperatures requires reliable instruments. It is just as important to know exactly what the correct temperature reading is as it is to have a furnace which will produce that temperature uniformly. Fortunately the cost of a good pyrometer is small. There is no excuse for even the smaller plants being without one.

The pyrometer maker is an expert in applying his

product and will recommend the proper type for the job. The high-resistance indicating type instrument with cold-end compensator is quite suitable for small plants. One pyrometer will measure the temperature in several furnaces. The only additional equipment needed is a thermocouple and wiring to each furnace.

The function of the pyrometer is simple but, unless one has had experience with the instrument, there seems to be a mystery to it. When two metal rods of unlike composition are twisted and welded at one end, a thermocouple is created. If the welded end is subjected to a higher temperature than the opposite ends, an electric current or difference in potential occurs. If the unwelded or cold ends of the thermocouple are wired up to a galvanometer capable of measuring delicate shades of current change, the instrument will record these changes. As the temperature of the welded end rises, the instrument will indicate a stronger current potential. The ratio between increase in temperature and increase in current potential is so uniform that the instrument scale can be graduated in degrees of temperature instead of millivolts.

The cold end compensator is a device for correcting the effect of the room temperature on the cold end of the thermocouple. It is automatic and requires no adjustment or manipulation, once it has been set correctly.

By all means purchase nickel-chrome protecting tubes for each thermocouple. These tubes will prolong the life of the thermocouples and pay dividends by preventing

breakdown of the pyrometer system when it is needed the most.

The pyrometer instrument should be inclosed in a glass front case and protected from direct shock and jar. These instruments are surprisingly sturdy. Ordinary building vibrations do not seem to affect their accuracy or life. There are several organizations in the country which make a business of installing pyrometer equipment and maintaining a periodic check on the accuracy of the instrument and installation. For this checking service a small fee is charged, but the results obtained from this service are worth many times the fee charged.

The equipment for the proper heat treatment of steel is extremely simple and surprisingly inexpensive, but no single item can be neglected or omitted without disastrous results.

Quenching Equipment Very Important

The quenching baths and equipment are just as important as good furnaces or proper pyrometric control. Improper quenching medium, insufficient quantity of the correct medium, or water-logged quenching oil will cause untold grief and damage. So will other factors, such as an oil which has been used so long that it becomes too thick and viscous.

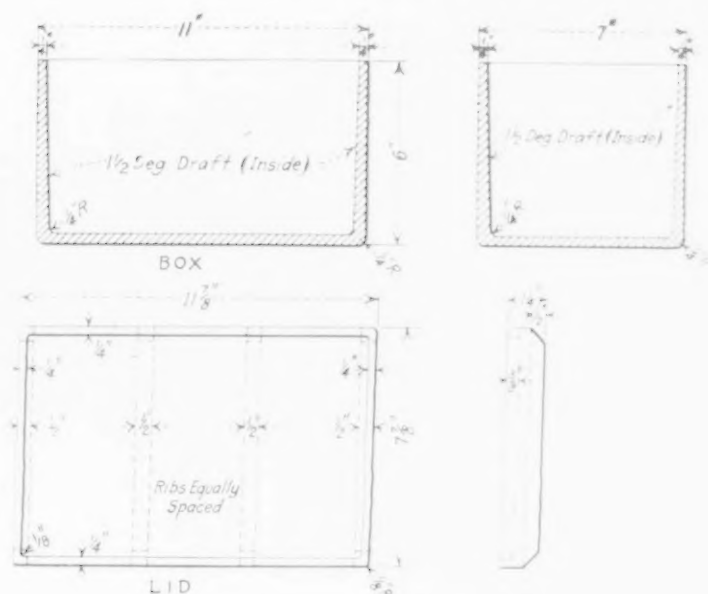
If a canvass were taken today on the subject of

the composition of quenching media, more quack formulae would come to light than would be considered possible in view of all the information available in trade journals on the subject. For the average small plant there need be only two quenching tanks, one holding clear cool water and provided with an overflow system and supply line. The other tank should be an oil tank with a method of water cooling the oil to prevent the temperature rising while large pieces are being quenched.

In the first illustration can be seen a water tank, B, 4 ft. 6 in. high and 3 ft. in diameter, supplied with

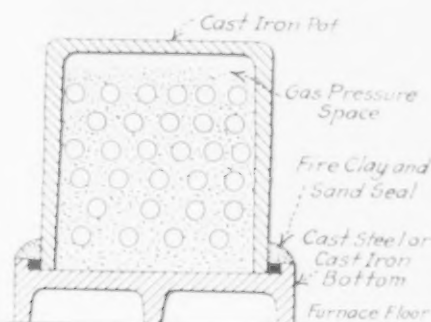
properly heated and quenched. Some of these compounds will work better than others. There are many reliable products on the market. For general use a compound which can be used several times with the addition of a third new material for each heat will be found to be satisfactory and economical. It is unnecessary to throw away the material until it burns out or breaks down into dust. A foundry riddle for separating the dust from the old material is a useful accessory.

In cases of emergency, coke breeze (crushed coke) or crushed charcoal can be used. It is better to use a



Sketch of the carburizing pot and its lid.

The carburizing pot assembled as it appears in a furnace.



overflow and fresh supply lines. A heavy wire-mesh basket, suspended by pulley and chain in the tank, catches the parts dropped into the tank. No time is wasted in fishing out the parts after hardening. The important detail here is plenty of cool water in sufficient quantity to handle even the unusual job that comes along only once in a long time.

The practice of hardening dies and cutting tools in oil requires an oil bath of similar proportions to the water bath. In this case the error is frequently made that a sense of false economy dictates the size of the oil tank. The smallest size water-cooled oil bath that is worth even considering is one holding a 50-gal. batch of quenching oil. This size is only suitable for delicate parts of very small cross-section.

The average small plant should install an oil bath of 100 to 150-gal. capacity. The larger tanks should be water-cooled as well. The oil tank, A, is inside a larger water tank with a 4-in. water jacket all round. The oil tank is raised 4 in. off the bottom of the water tank. The fresh water supply to the outer tank comes in at the bottom and the overflow, with 1 1/2-in. opening, discharges from the top. A wire-mesh basket is suspended in the oil to catch the parts quenched.

Some Carburizers Better Than Others

Carburizers are the chemical compounds and mixtures which, when heated, release the gases which penetrate the steel and deposit sufficient carbon so that the outer shell of the steel will become hard when

"speeder" along with these raw elements. The addition of 4 oz. of cyanide and 1/2 lb. of raw brown sugar to 10 lb. of coke breeze will give very effective results in an emergency. The cyanide fumes will be unpleasant and dangerous in a closed room, but most furnace rooms are well ventilated. We are talking of emergencies and not general practice.

Although it is a little outside the province of this paper, it is advisable to point out that the carburizing process is far from an instantaneous operation. The average 1-in. diameter shaft will take 12 to 14 hr. in the furnace to give a case deep enough to allow for grinding after hardening. The most common error committed in the carburizing process is failing to allow sufficient time for the process to take place. Under proper conditions, it takes from 3 1/2 to 4 hr. for the contents of a pot to heat thoroughly to the center. A carburizing duration of 6 to 8 hr. is required to give a proper depth of case. To attempt to hasten the process or otherwise shorten the time is poor practice, to say the very least.

It is well to remember that oxygen is the greatest consumer of carburizing compounds. Prevent oxygen from coming in contact with the red hot compound

(Concluded on page 490)

Making Rustless Steels in Open-Hearth or Electric Furnaces

THE production and fabricating qualities of iron-chromium alloys with varied carbon and nickel content for service under corrosive conditions were discussed recently by E. Houdremont (*Stahl und Eisen*, Oct. 30, 1930). According to the influence of the chromium and nickel contents of these alloys on the transformation of the iron, they may be classified as ferritic, martensitic and austenitic in structure.

Chromium raises the A_1 and lowers the A_2 temperature so that, above 15 per cent of this element, gamma iron does not occur in the Fe-Cr system and the ferritic structure results. Addition of carbon increases the field of the gamma iron-chromium solid solution so that martensitic steels, containing as much as 25 per cent chromium, may be obtained. Quenching these martensitic steels from high temperature makes them austenitic and confers good corrosion resistance, but the material is then brittle owing to residues of carbides at the grain boundaries and to coarse crystallization.

The austenitic structure disappears if the quenched alloy is reheated, but, by adding considerable nickel, alloys are obtained which are truly austenitic at room temperature and which do not become martensitic on heating. Even the 30 per cent chrome ferritic type becomes austenitic if sufficient nickel is added. By reducing the nickel content, all

intermediate stages between the ferritic and the austenitic types may be obtained. Table I shows the compositions of the principal non-rusting and heat-resistant steels.

Stainless steels today are made chiefly in electric furnaces, although open-hearths are also used. The raw materials to be considered are: Pig iron, scrap, steel ingots and liquid steel, ferrochrome, chromium metal, nickel, chrome ore as an alloying addition and high chrome-nickel scrap.

As nickel remains in the steel bath under either oxidizing or reducing conditions, the procedure for making chrome steels in the open-hearth is the same whether or not they contain nickel. High sulphur may cause difficulty in hot working because of nickel sulphide formation at the grain boundaries, but this may be overcome by heat treatment.

Use of Either Basic or Acid Open-Hearth Furnaces

Either basic or acid open-hearth furnaces may be used and, if the materials charged are pure, the heat is made in the usual way. Nickel may be added either at the beginning or end of the heat, but early addition removes the danger of chilling at the end of the heat. To avoid loss of chromium, ferrochrome is added later, after first quieting the bath with manganese and some silicon. If high-chrome scrap is charged in large quantities (50 per cent or more), some of the chromium lost may be recovered by deoxidizing the slag with 90 per cent ferrosilicon. A charge consisting entirely of scrap may be melted under special conditions without much loss of chromium, as may be seen in Table II, which shows data on trial heats made in especially hot furnaces, which in this case served simply as melting furnaces.

A recent development is to add chromite ore mixed with a deoxidizer, such as a high per cent ferrosilicon, to a bath of open-hearth steel as free as possible of slag. Table III gives an example of this process. The chief drawbacks of this method are the excessive wear on the furnace, the difficulty of producing metal containing more than 13 per cent Cr, because of reversible reactions, and the oxide inclusions which generally result from the high Cr_2O_3 content of the slag.

The electric furnace, either arc or induction of high or low frequency, is especially suited to the mak-

KEEN interest exists in the possibility of making chrome and chrome-nickel steels in the open-hearth furnace. This translated abstract from the German gives data on European experience.

Opinions on the fabrication and heat treatment of these steels, based on German experience, are also given.

ing of the stainless steels, either from liquid metal as tapped from the open-hearth, or from solid charges. High-chrome scrap is generally charged solid in electric furnaces to save the chromium. For high-chromium heats the basic arc furnace offers the advantage of a reducing lime slag, while the induction type is better suited for the easy production of very low-carbon alloys. On account of the strong affinity of chromium for nitrogen, the latter must be watched. By preheating the ferrochrome, nitrogen contents from 0.014 to 0.2 per cent are possible.

In the preliminary melting and refining of Ni-Cr steels in the open-hearth, premature deoxidation is to be avoided because the flat bath tends to absorb hydrogen which is evolved so slowly that porous castings may result.

In pouring ingots for rolling and forging, steel and cast iron molds seem about equally practical, and no decisive difference between top and bottom pouring has been noted. High melting alloys, such as the austenitic V2A steels, frequently dislodge particles of refractory which, on becoming trapped in the ingot, cause weakness. Bottom pouring in pairs seems to give better surface characteristics.

Occurrence of Dendrites

The martensitic chrome and chrome-nickel steels with 13 to 15 per cent Cr behave, on cooling, similarly to other air-hardening alloys. At very low carbon contents, faulty deoxidation may cause intergranular cracks. External cracks may result from too rapid cooling after rapid and hot pouring. Dendrites are very prominent in the martensitic type, while, in the pure ferritic 30 per cent chrome steels and in the half ferritic 18 per cent Cr steels, they show unusual lack of development. The purely ferritic type is relatively uninfluenced by type of cooling. However, the slight development of the dendrites tends to produce shrinkage on forging.

Castings of the austenitic Cr-Ni steels show the most marked dendrites. There is no evidence of intercrystalline cracks. The grain size varies widely according to the manner of cooling.

Heating Necessary Before Rolling or Forging

All non-corroding steels require heating to 2000 deg. F. before rolling or forging. The austenitic type is the most difficult to roll and requires the most power. On account of their high recrystalliza-

tion temperature, working at lower temperatures causes hardening. Softening occurs even in rapid rolling of the martensitic and ferritic types, and the latter develops large grains. On account of the small amount of reduction on the finishing passes, recrystallization must be considered in designing the rolls. Passes designed for rolling shapes from common steels are likely to cause difficulty because the tendency to spread is different in the stainless types.

Ferritic and martensitic steels require about the same amount of power for cold rolling as mild steel, but the austenitic steels require much more. While the deep-drawing qualities of austenitic steels such as V2A are unexcelled, their marked tendency to harden must be taken into account when considering the use of dies designed for mild steel.

Heat Treatment Differs Little from Carbon Steels

The heat treatment of the martensitic type does not differ greatly from that of carbon steels. Brinell hardness of 170 to 650 may be obtained from these air-hardening steels. They should be cooled carefully after hot rolling to avoid cracks. Annealing above the critical range corrects slight imperfections from hot and cold work, and permits control of grain size and mechanical properties. Corrosion resistance is





greatest in the hardened state resulting from quenching from 2200 deg. F.

There being no transformation in the ferritic steels below 2550 deg. F., the only effect of quenching is to hold the carbides in solution. As there is a great tendency for grain growth, and as this cannot be corrected by heat treatment, the recrystallization properties must be known accurately or the structure of the product may be ruined in the making.

Similar care should be observed in handling low-carbon 14 to 25 per cent chrome steels of the semi-ferritic type. However, the grain refinement in the martensitic component at 1900 deg. F. obscures the effect of the coarse ferrite grains.

Heat treatment of nickel-chrome steels is the simplest, since it is only necessary to quench from 2000 deg. to hold in solution the carbides precipitated in hot working. There is little tendency for coarse crystallization.

Fabricating Qualities Determine Practical Use

The practical application of these materials depends in large measure upon their fabricating properties. The martensitic chrome steels find comparatively little use in large-scale chemical apparatus because of their lesser resistance to acids. This class of steel may be welded with a rod of the same material but the seam must be heated afterwards to avoid cracking. Hot riveting (1100 to 1300 deg.) may be done with rivets of the same steel, and reheating is unnecessary if the critical range is not reached. Cold riveting with austenitic V2A steel rivets is also possible.

Ferritic steels may be welded, but the welds can

only be relied upon in special cases, owing to the coarse crystallization developed. Hot riveting has the same drawback, as well as the tendency of scale formed at the rivet heads to initiate corrosion. Many kinds of apparatus may be assembled by cold riveting ferritic steel, but if the joints are to be subjected to considerable hydrostatic pressure, leaks are likely to occur.

Austenitic Chrome-Nickel Steels for Chemical Industries

Austenitic chrome-nickel steels find extensive application in chemical industries. The parts are generally assembled by welding, followed by heat treatment. However, on account of distortion resulting from the heat treatment and the necessity of making some unannealed welds in service, it is important to know the behavior of such joints when heat treatment is omitted. Carbide precipitation commences at about 900 deg., with a resultant drop in elongation. Carbides commence to redissolve at about 1850 deg. The influence of temperature on the Brinell hardness of these materials closely parallels the amount of precipitated carbides. The elastic limit of V2A steels drops from about 57,000 lb. per sq. in. at 900 deg. to about 8500 lb. per sq. in. at 1850 deg.

The time as well as the temperature of annealing greatly influences the corrosion resistance. Corrosion resistance is impaired by carbide precipitation, the effect becoming more marked as the carbon content increases from 0.04 to 0.12 per cent in the 18 per cent chromium, 8 per cent nickel steels. While at 1450 deg. the greatest quantity of carbide is set free, the subdivision of the carbides set free at 1100 to 1300 deg. is such that intercrystalline corrosion is most pronounced after annealing at the latter temperature.

Prolonged annealing tends to shift the maximum susceptibility to acid attack to steels annealed at low temperatures, but even brief heating for welds causes intercrystalline corrosion. Other influences on susceptibility to corrosion are a certain tendency to form

Table I.—Compositions of Most Common Chrome and Chrome-Nickel Steels

Structure	Carbon Per Cent	Silicon Per Cent	Manganese Per Cent	Chromium Per Cent	Nickel Per Cent	Per Cent
Martensitic	0.15-0.20	0.40-0.70	0.40	14.0-14.5	1.5 - 2.0	
Martensitic	0.16-0.22	0.50-1.00	0.40-0.60	14.0-14.5	0.50- 0.70	
Martensitic	0.32-0.40	0.10-0.20	0.20-0.30	13.0-14.5	0.40- 0.50	
Martensitic	0.80-0.90	0.10-0.20	0.20-0.30	16.0-16.5		0.8-1.0 W
Half-ferritic	0.12	0.30-0.50	0.30-0.40	14.5-15.5	1.0 -2.0 }	
Half-ferritic	0.12	0.40-0.50	0.30-0.40	17.0-18.0	1.0 -2.0 }	
Ferritic	0.30-0.45	0.25-0.45	0.30-0.50	24.0-26.0		
Ferritic	0.20-0.40	0.25-0.45	0.30-0.50	30.0-32.0		
Austenitic	0.15	0.30-0.60	0.30-0.40	17.5-18.0	8.5 - 9.5	
Austenitic	0.15	0.30-0.50	0.30-0.40	16.7-17.5	9.5 -10.0	2.5-4.5 Mo
Austenitic	0.15	0.30-0.50	0.30-0.40	17.5-18.0	8.5 - 9.5	3.0 Cu
Austenitic	0.15	0.30-0.50	0.30-0.40	12	12	
Austenitic	0.30-0.40	0.30-0.60	0.50-0.70	17.5-18.0	8.5 - 9.5	
Austenitic	0.15-0.30	2.4 -2.7	0.50-0.70	24.0-26.0	19.0 -21.0	
Austenitic	0.30-0.40	to 4.0	0.40-0.60	10.0-12.0	37.0 -39.0	
Austenitic	0.15	0.25-0.45	0.60-0.80	15.0-17.0	56.0 -60.0	
Austenitic	0.12	0.80-1.0	0.60-0.80	18.0-20.0	78	
Austenitic	0.45-0.55	0.80-1.0	0.70-0.80	15.0-15.7	13.0 -13.5	2.0-2.5 W

Table III.—Chrome Steel from Reduction of Chrome Ore in Basic Open-Hearth

Charge		Lb.	
Hematite		7,700	
Scrap		18,700	
Lime		10,230	
Ore		880	
Fluorspar		1,540	
Ore mixture (ferrosilicon-chrome ore 50% Cr ₂ O ₃)		28,050	

Slag Composition, Per Cent								Metal Composition, Per Cent						
Al ₂ O ₃	SiO ₂	FeO	Fe ₂ O ₃	MnO	CaO	MgO	Cr ₂ O ₃	C	Si	Mn	P	S	Cr	Ni
Before addition of ore mixture:														
3.5	12.5	15.9	4.3	1.6	47.7	0.4	1.7	0.08	0.01	0.06				
After addition and reduction of chrome ore:														
2.9	34.8	1.5	0.6	0.6	32.6	13.0	6.5	0.16	1.5	0.5	0.019	0.017	13.1	0.24

alpha iron at 1300 deg., and the depletion of chromium in solid solution by precipitation as chromium carbide.

Hot riveting affords no solution of the problem of fabrication to exact dimensions; for the tendency for intercrystalline corrosion is developed, heat treatment would loosen the rivets, and scale accelerates corrosion. Cold riveting is only effective for service under weakly corrosive conditions where hydrostatic pressures are small.

By an exact study of the whole problem, a mod-

ification of the old V2A and V4A brands was developed which possesses the same chemical resistance but which is unaffected by welding temperatures. After 50 to 100 hr. heating at 1100 to 1300 deg., a 2500-hr. exposure to a hot solution of copper sulphate acidified with sulphuric acid developed no special attack at the weld. This material meets the demands of the chemical industry for an austenitic steel capable of being welded without impairing its corrosion resistance.

Table II.—Production in Acid or Basic Open-Hearth Furnaces
Production of Austenitic Chrome-Nickel Steel in the Basic Open-Hearth:

Charge	Lb.	Composition of Finished Steel, Per Cent						
		C	Si	Mn	P	S	Cr	Ni
Chrome steel, 25% ...	2,640							
Chrome 30%, nickel 25% steel	3,850							
V2A steel (18% Cr, 8% Ni) ..	40,920							
Liquid steel	2,200							
Ferrosilicon (98% Si)	616							
Ferrochrome (66% Cr)	660							
Total charge	50,886	0.25	1.08	0.86	0.027	0.016	17.8	9.3
Yield	47,500							

Production of Austenitic Chrome-Nickel Steel in the Acid Open-Hearth:

Charge	Lb.	Composition of Steel, Per Cent						
		C	Si	Mn	P	S	Ni	Cr
Cr 15% steel ..	8,800							
V2A steel (18% Cr, 8% Ni)	4,840	After melting:						
V2A steel (18% Cr, 8% Ni)	2,860	0.27	0.2	0.27			8	11.5
Cr 15%, Ni 60% steel	1,430	After ferrochrome addition:						
14% Ni steel ..	990	0.27	0.62	0.28			6	21.2
	18,920							
Ferrochrome (60% Cr)	3,100							
Ferrosilicon (98% Si)	220							
Manganese	22							
Total charge ..	22,462	Final composition:						
Yield	21,300	0.29	0.83	0.30	0.028	0.023	6.8	19.9

Composition of Slag, Per Cent					
FeO	MnO	SiO ₂	Cr ₂ O ₃	Al ₂ O ₃	
11.4	9.7	38.3	17.0	19.0	
5.78	4.3	42.4	24.0	22.1	

Mechanical Handling, Sorting and Loading of Limestone

ONE of the largest steel mill stone quarries in the country was opened for operation Nov. 14, 1930. It is the Inland Lime & Stone Co., a subsidiary of the Inland Steel Co. The plant has a rated capacity of 3,000,000 gross tons a year, which is practically double the present needs.

Operation at this plant, which was designed and built by the Stephens-Adamson Mfg. Co., Aurora, Ill.,

can be separated into three divisions: the quarry, preparation and delivery to storage, and reclaiming and loading.

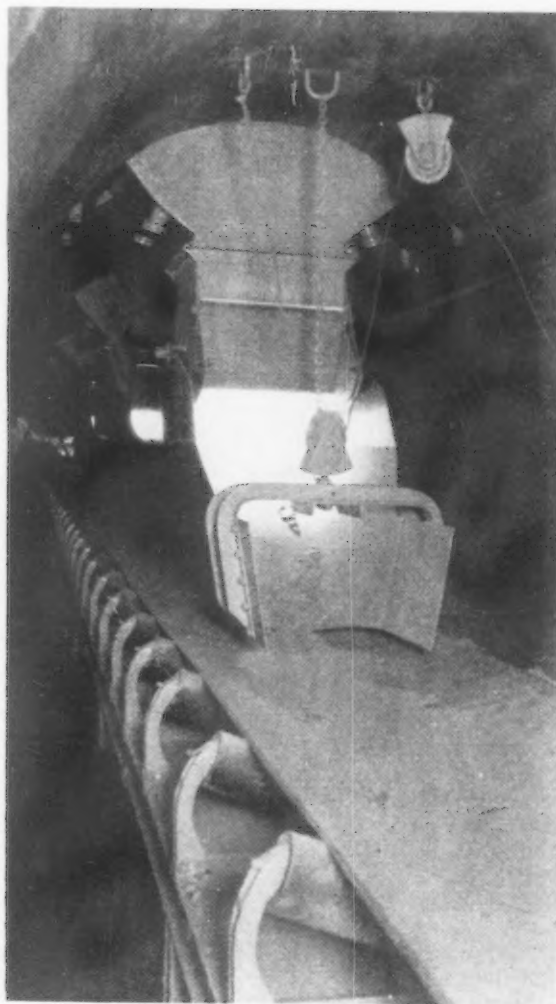
After the overburden, which is very light, has been stripped off, 6-in. holes are drilled in the rock by Armstrong portable electric drilling rigs equipped with caterpillar-type treads. The rock is loaded into cars by a Bucyrus-Erie Model 170-B, 5-yd. electric shovel. Transportation from the quarry to the plant is over a seven-mile electrified standard-gage railroad built by the company. A feature of the electrical construction of the railroad is that each trolley wire pole is set in a 2-ft. block of concrete, which forms a base sufficiently heavy to hold it upright under almost any condition. This method made possible the avoidance of the difficult and somewhat expensive alternate of setting the trolley wire poles in the quarry by ordinary methods. Loose rock banked around the concrete blocks makes settings that are practically permanent, and at the same time it is rather a simple matter to move the poles to any desired new location of the track.

Direct-current power to operate the haulage locomotives, which were made by the Differential Steel Car Co., Findlay, Ohio, is supplied by two converter substations, one located at the quarry and the other at the plant. Each substation has installed in it two 1000-kw. General Electric Co. motor-generator sets, the one in the quarry being arranged for remote control from the substation at the plant.

Cars Are Dumped by Pneumatic Device

Rolling stock used in transportation from the quarry to the plant consists of a fleet of fourteen 30-yd. Koppel Industrial Car & Equipment Co. side dump cars and two electric locomotives. A like number will be added in 1931. The cars are of the standard side-door dumping variety and are dumped by a specially designed apparatus located at the crusher house. The locomotives are equipped with 30-yd. bodies and are self-dumping by means of a pneumatic cylinder located under the body. The average trip consists of seven cars and the locomotive or a total of 400 tons per load.

On arrival at the primary crusher house the locomotive and cars are dumped into the hopper of a 60-in. McCully gyratory crusher, driven by a 250-hp., 600 r.p.m. motor through a Tex-rope drive, the entire in-



Loading gates and chutes feed to belt conveyors in concrete tunnels over which the crushed stone is stored.

▲ ▲ ▲

The stackers are movable towers about 60 ft. high. They are in reality large belt trippers.

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stallation having been built by the Allis-Chalmers Mfg. Co., Milwaukee. The special car dumper consists of two pneumatic cylinders, located near the track opposite the hopper. Control for the dumper is located on a gallery well above the track so that the operator has a clear view. It is possible to dump a whole train at the rate of a car every 2 min., or about 1500 tons an hour.

After being dumped the stone passes over a grizzly consisting of 14 bars of structural steel, with wearing caps of manganese steel. Stone 10 in. and under goes through the grizzly and is passed directly to the main plate feeder; the oversize goes through the crusher and then through the feeder. In addition to the hopper just described there is another hopper directly under the track. This has a grizzly with 4 x 1½-in. bars with 10-in. openings, and discharges to a feeder, underneath the hopper, consisting of a series of manganese steel pans about 4 ft. long, running on an arrangement that resembles nothing so much as the crawler mechanism of a tractor. The manganese steel pans were built by the American Manganese Steel Co.,

Chicago. The feeder is driven by a 10-hp. motor at 40 ft. per minute through a Falk Corpn., Milwaukee, gear reduction unit. It discharges directly to a belt conveyor, 4 ft. wide and 209 ft. long, which transports the material to the grizzly house. The control for all equipment drive is centralized and provides automatic starting sequence. The belt conveyor to the grizzly starts first, then the feeder and finally the crusher.

The second, or storage, section of the plant may be considered as beginning at the grizzly house. At present the material from the primary crusher house is delivered to a hopper, from which two chutes deliver it to the two live-roll grizzlies for scalping. Like all other chutes, or for that matter, all surfaces subjected to the sliding action of the stone, they are provided with wear plates of manganese steel. The fines go through the grizzly to a 74-ft. conveyor, which carries them to the secondary crusher house. The grizzly house thus forms the first distributing point in routing the material to the storage piles.

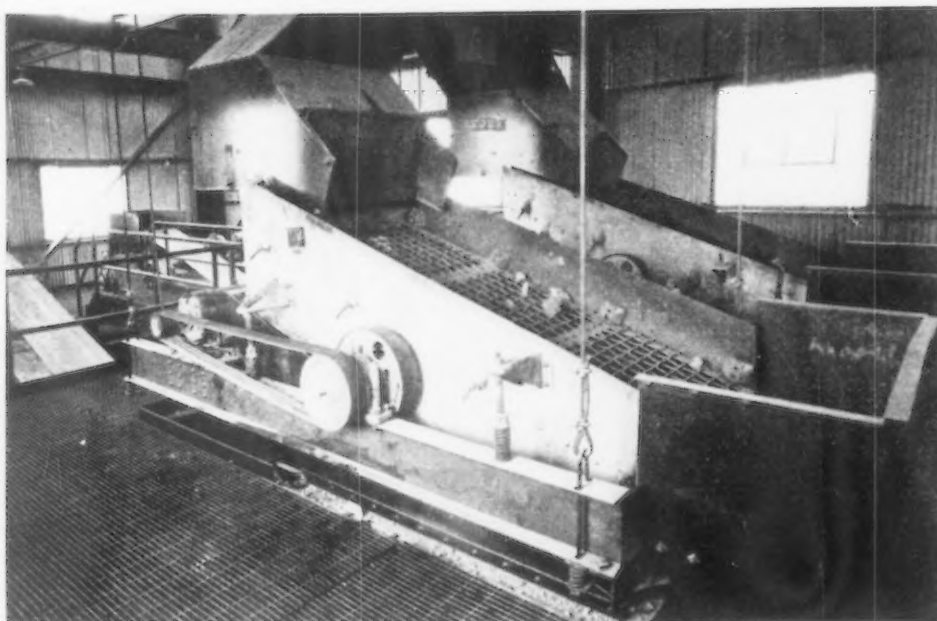
Equipment in the secondary crusher house consists

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NEAR Port Inland, on the shore of Lake Michigan, the Inland Steel Co. has established a subsidiary which is one of the largest steel mill stone quarries. It has a rated capacity of 3,000,000 gross tons per year. The handling of the material is performed by a complete and carefully planned system of mechanical handling, presenting features of practice that suggest themselves as applicable to bulk handling problems in other industries.

One of the departures from usual practice is the setting of trolley wire poles in heavy but movable concrete blocks, avoiding the cost of permanent construction and facilitating changes in track location.

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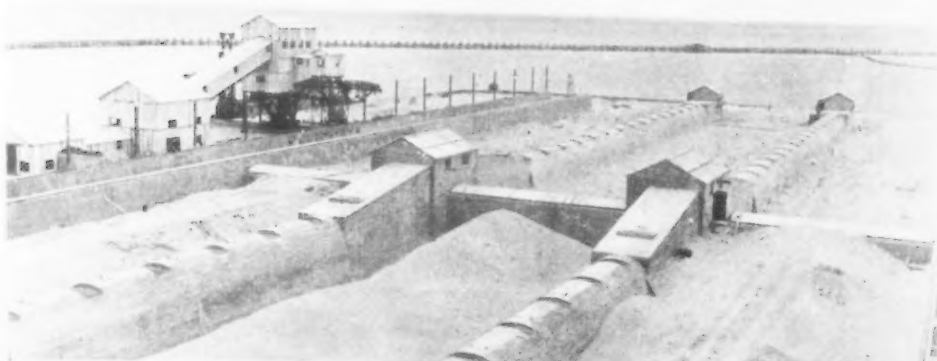
Shuttle conveyors are here visible back of the screens.



The loading tower is equipped with a shuttle conveyor which can be raised and lowered and moved in and out.



These concrete tunnels, located in the storage yard, house reclaiming conveyors. The small houses show the location of the transfer tunnel.



of a 20-in. Allis-Chalmers McCully crusher and two Symons cone crushers. When reduced, the stone is delivered on one conveyor to the screen house for sorting. This material from three separate sources can be combined in one flow channel for delivery to the sorting process, an arrangement that eliminates a great deal of rehandling and assures a steady flow of material to the screens.

Screening equipment consists of six vibrating screens, four single, and two triple-deck, arranged in banks of two, with the coarser ones above. The last screen operates under water spray, the sludge and water being flumed to the lake. All of the material destined for re-crushing is gathered on one belt, which is 300 ft. long with a capacity of 200 tons an hour.

Stackers Are Movable Towers

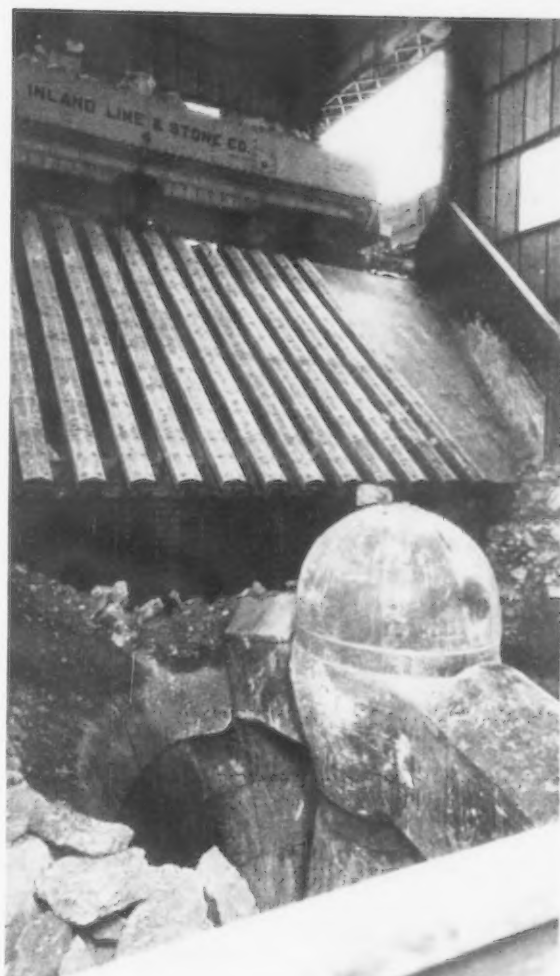
The storage space comprises an area of about 500 x 1200 ft., extending at right angles to the line of material flow from the grizzly to the screen house, and parallel to the loading dock. This area is divided into two sections by the tracks on which the stackers run, each area between stackers accommodating two piles of different sizes of stone parallel to each other. The stackers are movable towers about 60 ft. high, running on tracks supported by heavy concrete foundations. On the side toward the receiving end they are equipped with extensions about 50 ft. long, which support the framework on which the conveyors are carried. Each stacker has a movement of 50 ft. a minute. On the side toward the storage pile, each stacker is equipped

with a loading wing, or boom, about 60 ft. long, which extends out to about the middle point of its particular storage area. In reality these stackers are nothing more or less than gigantic belt trippers, the conveyors from the grizzlies or screen house, as the case may be, going up the incline into a house on top of the stacker and then down along the track again.

Reclaiming Conveyors Are in Tunnels

Arriving in the stacker, the material is delivered to a curved chute, which in turn delivers it to the wing conveyor. The main belt capacity varies with the size of the material, that for the two largest being 640 tons an hour and for the smaller 280 and 240 tons an hour respectively. The capacities of the wing conveyors are the same as those of the main conveyors for each stacker. All main belts are equipped with an automatic belt tension device. The entire sequence of distribution requires between 5 and 6 min. to complete.

Concrete tunnels have been built down the center of each area on which the stone is stored. These tunnels are equipped with loading gates spaced about 20 ft. apart. In these tunnels are the reclaiming conveyors, each being 370 ft. long with capacities of 1500 tons an hour. In the case of the piles for the two larger sizes of stone there are two conveyors, back to back, the tunnels being 685 ft. long. Running at right angles to the reclaiming tunnels is another tunnel connecting with the loading point. This tunnel houses a 60-in. conveyor which receives material from all the receiving conveyors, there being four transfer points. The reclaiming conveyor discharges into a hopper which delivers the material to the transfer conveyor by means of a chute. This conveyor has a capacity of



A car ready to be unloaded to the grizzly and 60-in. crusher in the primary crusher house.

3000 tons an hour, or sufficient to handle material from any two reclaiming conveyors working together.

The transfer conveyor delivers the stone to an incline conveyor 160 ft. long, which in turn delivers it to a shuttle conveyor in the loading house, where the material is weighed.

This plant has been built for a total storing capacity of 750 tons an hour and a loading capacity of 3000 tons an hour, either to Lake freighters or railroad cars. The dock is 700 ft. long and the distance from the face of the dock to the breakwater is 800 ft. The area of the stilling basin is 65 acres, part of which has been dredged to 22 ft. below low water datum.

THERE has been much discussion in Great Britain of the benefits or otherwise of a protective tariff. This has come particularly to a head in connection with the steel industry which, in that country, has been languishing ever since the World War. A correspondent writes to

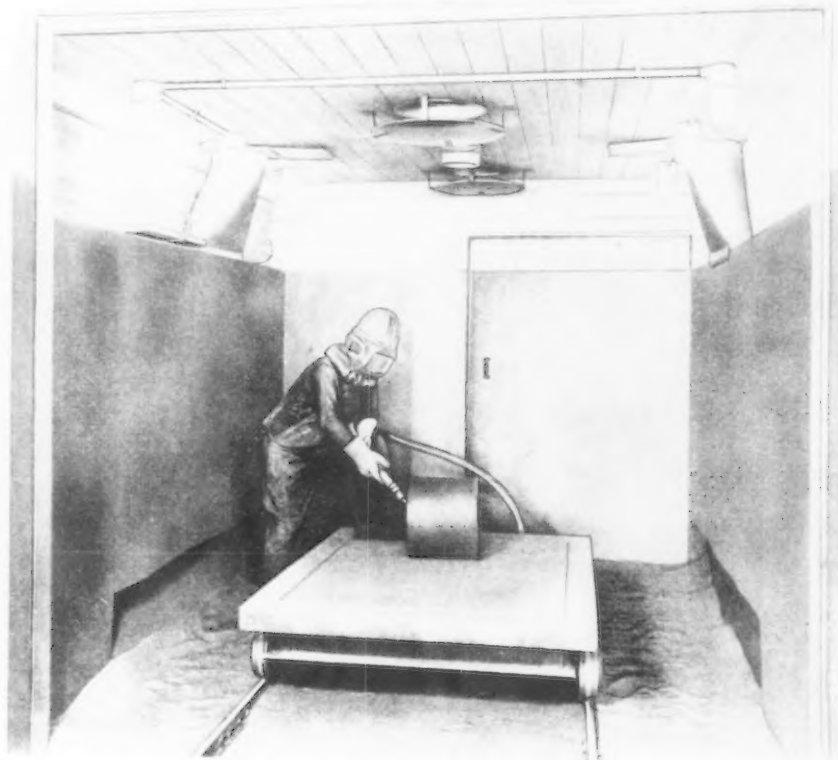
Engineer (London) comparing the growth of the steel industry in Great Britain under free trade with the simultaneous growth of the industry in Germany, United States, France and Belgium, all four being under protection. Figures in millions of tons are given for 1887, 1907 and 1927 for the five countries, as follows:

	1887	1907	1927
England	2	6½	9
Germany (with Saar)	1½	12	18
United States	3	22	45
France	½	2½	8
Belgium	¼	1½	3¾

The writer points out that British production under free trade has increased three-fold in 40 years. Simultaneously, the other four countries under protection increased from 12 to 16-fold.



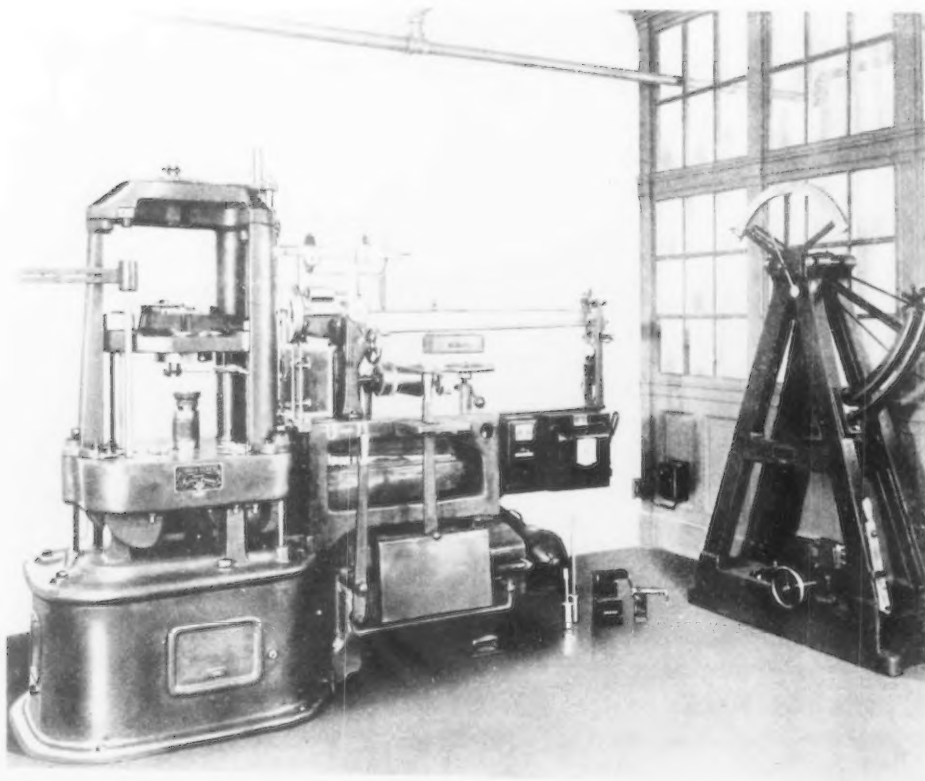
View of the plant from the breakwater. The primary crusher plant is at the extreme right and the loading tower is at the extreme left.



PICTORIAL VISIT TO A MODERN CANADIAN BRONZE FOUNDRY

By D. MACINNES

THE National Bronze Co. foundry, St. Laurent, Quebec, is equipped with standard Pangborn sand blast equipment, as well as tumbling barrels and "fettling" equipment. The monorail system is extended through the cleaning room to the shipping floor.

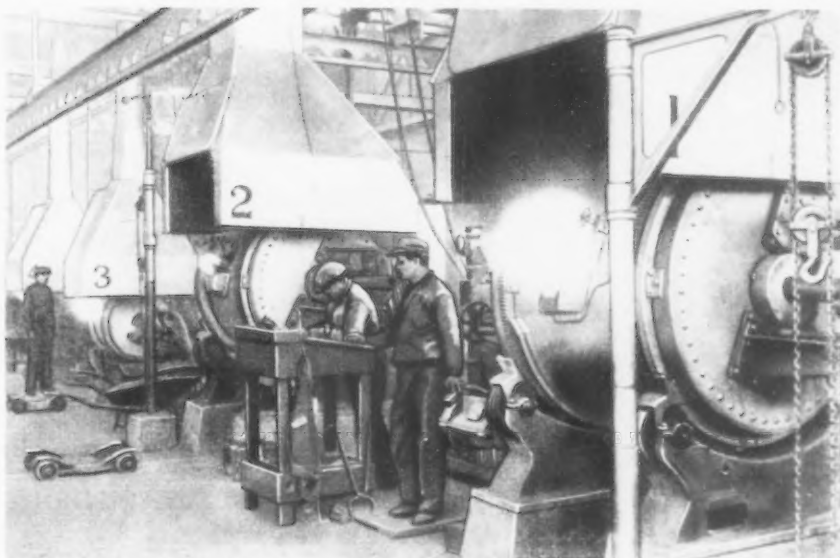


A WELL equipped testing laboratory is one of the features of this plant. It contains an Olsen universal testing machine of 100,000 lb. capacity, an Izod impact testing machine, a lever action Brinell testing machine and other equipment for the testing of products and materials used in production.





RECENTLY put into operation, the St. Laurent bronze foundry is large and modernly equipped, with a capacity of 35,000 lb. a day. The product is chiefly for architectural and railroad uses. Mechanical handling facilities have been extensively provided, as indicated by this view of the molding bay.

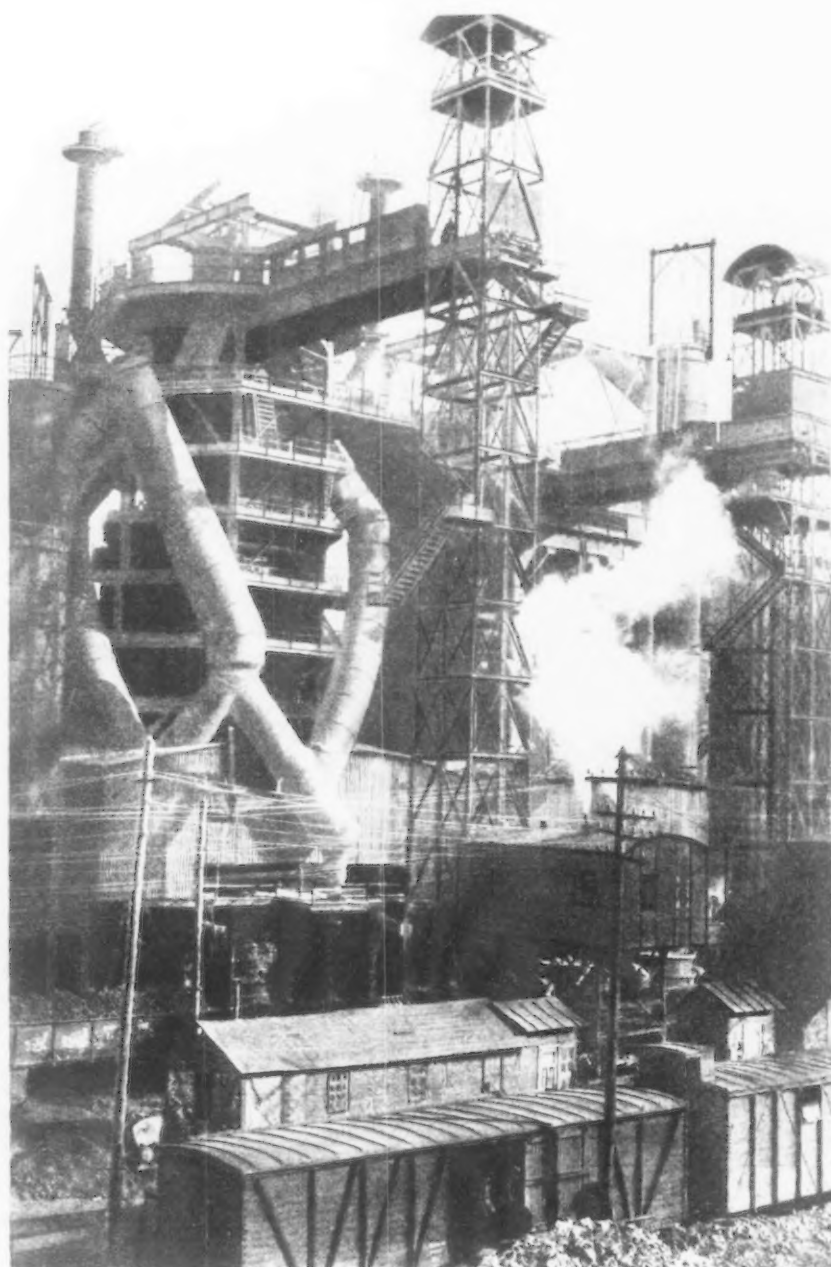


THE melting equipment includes a battery of four Detroit electric arc, rotating-type furnaces, power-operated and automatically controlled. Each furnace is equipped with a control panel with instruments indicating the time to start rocking and when the metal is ready for pouring.



MOLDING and core sands are stored in bins shown in the background of this picture. This department is also equipped with sand-mixing machinery imported from France, and with three special gas-fired ovens for baking cores. (Below)





RUSSIA STILL OFFERS LARGE MARKET FOR AMERICAN EQUIPMENT

By M. MENDELSON

A REVIEW of the Soviet fiscal year, ended Sept. 30, 1930, shows that purchases made by the Soviet Union in the United States attained an unprecedented total. Orders placed through Soviet trading organizations in this country totaled \$149,223,000, or 38.6 per cent more than in 1928-29, when purchases equaled \$107,651,000. The turnover (including purchases and sales) last year of \$180,240,000 was four times the average pre-war turnover.

During the past seven years Soviet orders in the United States have trebled in value and were nearly four times as great as sales during the period. Since 1923, when trade was resumed between the two countries, Soviet-American trade has totaled \$750,777,000, of which purchases for the U. S. S. R. made up \$599,209,000 and sales \$151,568,000. The great increase in turnover is accounted for almost entirely by American exports to the U. S. S. R.

Exports from the United States to the Soviet Union consist mainly of machinery and equipment for new mills, factories and mines, electrical and transport equipment and agricultural machinery. The share of raw materials (mainly cotton), which in 1928-29 made up one-third of the purchases, has been declining, amounting to 13 per cent of the total purchases last year.

Leading Item Is Farm Machinery

Agricultural machinery and supplies constitute the largest item in Soviet purchases in this country, in 1929-30 the total value of such orders having been \$67,442,000, or 139 per cent over those of the preceding fiscal year. In this group orders have increased tenfold since 1926-27, but the most marked upward swing has been during the past two years, the first two years of the Five-Year Plan for the economic development of the Soviet Union. The process of mod-

mechanizing agriculture through mechanizing agricultural processes raised the demand for tractors and engines considerably in 1929-30. In 1930 the U. S. S. R. rose to first place from third in rank in 1929 among foreign customers for American agricultural machinery and supplies. Official reports indicate that, in the first half of 1930, two of every three tractors exported by the United States went to the Soviet Union, which bought three times as many tractors as Canada, the second best market.

The total area in Russia under cultivation in 1930 was 128 million hectares (316 million acres), an increase of 7 per cent over the preceding year. The increase in sown area was accounted for almost entirely by the socialized sector, that is, by collective and State farms, which tilled about 42 million hectares. In 1931 it is planned to double the area sown by State and collective farms. Last year more than 100,000 tractors were in use on these farms, and the demand is expected to increase several-fold in 1931. In addition, the number of tractors in use in the cotton regions, where the sown area is expanding rapidly, will be increased considerably.

Gain of 51.5 Per Cent in Industrial Machinery Purchases

Industrial machinery and equipment purchased in this country during the past fiscal year showed a 51.5 per cent increase over the preceding year, totaling \$46,050,000, against \$30,337,000 in 1928-29. The U. S. S. R. is now the third largest foreign market for these commodities, as compared with fourteenth in 1925. The United States Department of Commerce recently reported that exports of metal-working machinery from the United States during the first nine months of 1930 were the greatest since 1919. This fact is accounted for to a great extent by the large purchases made by the Soviet Union.

The extensive construction program mapped out by the Five-Year Plan, involving capital investments of many billions of rubles, has been the cause of the large increase in purchases of machinery and equipment abroad, especially in this country. There is undoubtedly a distinct tendency in the Soviet Union to favor American machinery and methods, which are regarded as better adapted to Soviet conditions than those of other countries. American engineers, technicians and foremen, numbering about 1000, have been engaged either through contracts with firms or

individually to assist in planning, constructing and operating the numerous giant plants now under way in the U. S. S. R.

The leading group of purchases of industrial equipment last year was that of equipment for machine-building industries, mainly new tractor and automobile factories. Orders in this group totaled \$18,279,000, a gain of 218 per cent over the previous year. For the metallurgical industry the gain was 349.1 per cent (from \$1,263,000 to \$5,682,000). Equipment for the oil industry totaled \$8,154,000, the U. S. S. R. being the principal American market for this type of equipment.

Capital investments in large-scale State industry rose from \$720,000,000 in 1927-28 to \$875,000,000 in 1928-29 and to \$1,600,000,000 last year. The planned expenditures for 1931 are set at over \$3,000,000,000. Already well over 2000 new large plants and factories have been built under the Soviet regime. The general tendency in the past few years has been in the direction of a steady increase in the proportion of capital investments going into heavy industry, these rising from 70 per cent of the investments in industry in 1927-28 to 85 per cent in 1929-30.

Large Increase in Pig Iron and Steel Production Planned

The construction of large metal plants is being undertaken on a greater scale than ever before. It is planned to increase pig iron production from 5,000,000 tons in 1930 to 17,000,000 tons in 1933. In the Ural Region, at Magnitogorsk, the largest steel mill in Europe and one of the largest in the world is under construction with the technical assistance of Arthur G. McKee & Co. of Cleveland. This plant will comprise eight blast furnaces, with an estimated annual production capacity of 2,500,000 metric tons of pig iron. The cost of construction, including various subsidiary enterprises, is estimated at \$450,000,000.

Second in importance is the steel mill under construction in the Kuznets Basin in Siberia, with an estimated annual capacity of 1,100,000 tons. This enterprise is being built with the engineering cooperation of the Freyn Engineering Co. of Chicago. The total cost of construction, including a regional power plant and a workers' town, is estimated at \$300,000,000. Near the Dnieper River, the Zaporozhe steel plant, the third in size in the U. S. S. R., is under construction; the annual output is to be over 1,000,000

THE author, who is head of the information department of the Amtorg Trading Corp., New York, Soviet buying organization in this country, presents a progress report of the developments in Soviet Russia, under the Five-Year Plan, in the building of plants for the manufacture of pig iron, steel, agricultural machinery and automobiles, together with the fiscal results of these building operations upon trade between the U. S. S. R. and the United States. The article is a summarization of the various projects that have had or will have a direct effect upon the employment of American machinery or American technical assistance in their consummation.

tons and the total cost is set at \$300,000,000. All three plants are scheduled for completion in 1932.

Several other steel plants of lesser capacity are planned and in process of construction in the Urals, central Russia and southern Ukraine, at an estimated total cost of \$1,500,000,000 for the whole group. The demand for iron and steel products in the U. S. S. R. is continually on the increase, and, even with the great developments planned, which will more than treble the

The total cost of construction was \$38,000,000. The designs for the buildings were prepared by Albert Kahn, Inc., Detroit architect. The work of construction was carried on at record speed, being accomplished within a year, more than a year ahead of schedule. The eventual annual capacity will be 50,000 15 to 30-hp. tractors; production is gradually being brought up to schedule and now amounts to 40 tractors a day. Ninety per cent of the entire basic equipment for the first installations was purchased in the United States, upward of 100 American companies having supplied equipment.

The Rostov agricultural machinery plant was completed in June, 1930. The total cost of construction was over \$35,000,000. This plant is one of the largest of its kind in the world.

Other tractor plants in process of construction include the Cheliabinsk plant in the Urals, scheduled for completion in 1932. Its annual output is estimated at 40,000 to 50,000 tractors of the caterpillar type. A commission of Soviet engineers, in conjunction with American experts, is now working in Detroit on the designs for this plant. At Kharkov, in the Ukraine, a tractor plant is scheduled for completion during 1931, with an ultimate annual production capacity of 50,000 tractors of the 15 to 30-hp. type. The tractor department of the Putilov machine-building works in Leningrad is being almost completely rebuilt to raise the annual production from about 3000 in 1929 to 30,000. The cost of reconstruction is estimated at \$18,800,000.

Automobile Plant to Start Production in August

In the automobile industry the principal development is the construction, with the technical assistance of the Ford Motor Co., of the automobile factory at Nizhni Novgorod, with an annual capacity of 140,000 Ford cars. The

assembly plant is already turning out cars from parts imported from the United States. Actual production is scheduled to start in August of this year. The Austin Co. of Cleveland is cooperating in the construction of the new city being built to house and provide for the cultural needs of the workers there.

In Moscow, the Amo automobile plant is being enlarged to produce 50,000 motor trucks annually; this plant is specializing in the construction of 2½-ton trucks. Several plants are under construction for automobile accessories and supplies, including the tire plant at Yaroslavl to cost \$55,000,000 and one at

(Concluded on page 527)



Building a textile machinery manufacturing plant in Leningrad, with women structural steel workers taking their places alongside men in the erection. This plant will turn out 22½ million rubles a year worth of machinery when operating at full capacity.

output, the production will not be able to satisfy the requirements of the country.

Side by side with the growth in steel mills the number of new plants for the manufacture of many types of machinery is growing rapidly. There are especially great developments in the manufacture of agricultural machinery and spare parts. Two of the outstanding achievements thus far in this field have been the construction of the Stalingrad tractor plant and the Rostov agricultural machinery plant in the North Caucasus. The Stalingrad tractor plant in the lower Volga region started operations in June, 1930.

Controlling Factors in Machine Tool Obsolescence

UNTIL 15 years ago depreciation was a greater factor than obsolescence in the replacement of machine tools, but today obsolescence is more important, stated L. A. Blackburn, formerly with the Oakland Motor Car Co., Pontiac, Mich., in a paper on "Controlling Factors in Machine Tool Obsolescence," read at the production meeting of the Society of Automotive Engineers at the Book-Cadillac Hotel in Detroit on Jan. 20. The paper was prepared in collaboration with J. W. Brussel, works manager, Timken-Detroit Axle Co., Detroit, and A. R. Fors, planning manager, Continental Motors Corp., Detroit.

As applied to machine tools, it is the belief of Mr. Blackburn that obsolescence is concerned only with their economic value, not their physical condition. A machine may be as good as the day it was built, in fact it may never have been used, but its economic value may not justify setting it up, because more modern machines which can operate more economically are available.

Obsolescence must be recognized and given adequate values if the manufacturer would avoid financial difficulties. Records should be established so that information is at hand covering the particular conditions existing in a certain manufacturing unit and so that a better basis than average data is provided for actuarial studies. However, this requires close cooperation between production and accounting departments with a definite idea of what the former needs in the way of records to determine the economic value of the special piece of equipment under investigation.

When applied to the automotive industry, the standard government allowance for depreciation on all equipment is 10 per cent, according to Mr. Blackburn. In this factor all the long-life equipment is put in with the short-life and averaged; in the group are machines with a wide variation of depreciation. Actual depreciation is controlled by good or bad maintenance, selection of the proper size of machine to do the job, tooling, speeds and feeds, and the number of hours operated per year.

When Is a Machine Tool Obsolete?

In answering the question, "How are we to determine when a machine tool is obsolete?" Mr. Blackburn points out that the first thing to do is devise ways and means of proving to the management that the investment to be made in replacing equipment will earn a satisfactory return. Here the risk must be compensated for by the size of the return; that is, one shop having staple production may think 15 per cent is sufficient, whereas another with methods

subject to frequent change can properly insist upon 50 per cent.

Yield may be divided into two parts, visible and invisible. The former is represented by direct savings through the use of the new equipment as compared with the old on probable forecasted production. The latter cannot be so easily ascertained. It takes the form of greater accuracy, smaller inventory or gives the opportunity of working a select crew of skilled men rather than a large force of average ability. Liquidity is a minor factor and is represented by fair salvage value of the equipment. In this connection a standard machine for which a large demand exists has a greater liquid value than one for which the call is limited.

Actual Cost May Not Reveal Obsolescence

On the basis of actual cost a machine may not appear to be obsolete, but standard cost would immediately show that it is. On a schedule of 200 days a year and 19 hr. a day, a standard cost would be based on 3800 hr. a year. The actual cost on a machine operated 2400 hr. would be different. Here the distinction is between actual cost or cost as it is and standard cost or cost as it should be.

Average burdens are misleading, but required returns are more misleading. For example, most property owners would be glad to rent buildings on a 6 per cent return, but in accounting practice the total investment is set up and 15, 20 or 30 per cent return is required. On this basis the machine running 2400 hr. a year will show a return of 40 to 60 per cent on investment and should be classified and separated from property and real estate so that the true value would reflect the ability of the man in charge to keep it in shape to yield the proper return.

The author advocates going a step further and distributing burden to the smallest economic centers possible, classifying it under three heads: building, equipment and general overhead which furnishes supervision, tools, supplies, power, heat and light. This burden should be divided among these centers as equitably as possible, eliminating the general spread of burden rate over these departments. In other words, a department is set up to produce so many pieces per hour spread over a year. With the seasonal fluctuation in the automobile industry, the fact that this equipment is not used is no fault of the production man. He has provided equipment as called for by the management. Any unabsorbed burden due to lack of production should go into the bracket of "Manager's Controllable." This may or may not be practicable from the stand-

point of accounting, but from the standpoint of efficiency, development of an organization, the allocation of responsibility is properly placed and the executives can see the results of their decisions.

The automobile maker who is uncertain of the public demand for his product will hesitate to tie up capital in special equipment, preferring to add more direct labor until the problem is settled. Once his mind is made up that he will continue the product, with minor changes in machine parts, over a period of two or three years, it is profitable to consider out-of-date equipment obsolete and increase capital investment with a satisfactory reduction in direct labor. The condition which makes it desirable for the manufacturer to take this step extends all the way down the line to every supplier who is furnishing machine parts or such parts as castings, forgings, stampings and the like.

Extremes of Specialization Prove Costly

About 1920 some tool engineers went to the extreme in designing single-purpose machines or tools to do a particular number of operations on a particular piece. The tremendous expense of designing these machines, as well as the breakdowns while they were in operation requiring many hours to repair with a consequent loss of production, gave them a bad name. This movement was succeeded by the efforts of machine tool builders to design a greater degree of flexibility into so-called single-purpose machines. This experiment was not entirely successful, due to the fact that the spindles were made adjustable so far as spacing was concerned.

At this stage the industry began to develop tool engineers with mechanical ability, shop experience, familiarity with cost and investment, and a little foresight. The machine tool builder then had someone who could determine the point at which to stop and the number of operations one machine could perform successfully over a period of time with the least mechanical interruptions and delays. "We believe," says the author, "that with the further development of a proper tool engineering staff which will be trained more and more in the problems of production, together with the experience of machine tool builders in setting a standard of building a machine of known value, which means longer life, eliminating the weak points and putting stability into equipment, the two lines drawn on a chart of depreciation and obsolescence are again approaching a point where they will present another real problem to management."

Replacement Facts Must Be Properly Assembled

In order to convince the management that the purchase of new equipment is justified by the savings to be gained, the tool engineer must present the facts in an understandable fashion. Mr. Blackburn stresses the necessity for guarantees accompanying machine tool builders' proposals and then discusses various formulas for arriving at the savings. He declares that the one developed by Warner & Swasey is the simplest and will answer the purpose for quick methods, but is not accurate from the standpoint of all the facts. This brings up again the discussion of accuracy of forecast and days' production

MACHINE tool depreciation formerly was equal to or greater than obsolescence, but now the tables have been turned, state the authors of this article, who discuss the factors rendering machine tools obsolete, such as accounting policy, stability of product, growth of organization and designing of flexible single-purpose machines. Several formulas for determining savings to be made from new equipment are presented and reasons why accurate predictions can or cannot be based upon them are stated.

or hours per year which it is hoped that the schedule will justify. It is a gamble that accompanies every investment, but such gambling is essential if industry is to remain progressive.

The S K F formula considers the value of the old machine, also showing the number of months required to pay for the equipment, states Mr. Blackburn. However, it gives less return on the investment than the Warner & Swasey method, using a 6 per cent interest charge which is not sufficient return on machine tools. On account of the uncertainties of production, which is governed by sales, the machine must show a satisfactory return over and above interest rates.

Many factors of difficult valuation, which are more or less anyone's guess, have to be determined in the A. S. M. E. formula, according to Mr. Blackburn, who points out that it takes in all of the items necessary to reach the correct answer, but due to the complicated accounting methods, burden controls and anticipated life of the equipment, as well as forecasting maintenance cost, is still open to criticism because of an inadequate return on the investment. This formula does not correspond with the accounting methods and policies of some of the corporations using machine tools. It gives credit for the value of an old machine which may or may not be realized. The hourly cost of the old machine would be based on an unknown quantity and this applies to the hourly cost of new machines.

Formulas Give Wide Variety of Results

Still another formula, combining some of the good and bad features of the others, is as follows:

$$R = \frac{N(C_1 - C_2) + 19 \times 260 - (10\% M - 10\% O_1) - X}{M + T + (O_2 - O_1)}$$

C_1 = present cost, direct labor plus overhead
 C_2 = New cost, estimated direct labor plus overhead
 M = Gross book value of new machine or new cost plus freight and installation
 N = Number of pieces per hour by new method
 O_1 = Gross book value old machine
 O_2 = Net book value old machine
 O_3 = Salvage value old machine
 R = Return on investment
 T = Cost of new tooling
 X = Extra costs of power, supplies and the like
 Assuming 19 working hours per day, 260 days per year and 10 per cent yearly depreciation on capitalized items.

Mr. Blackburn comments that this formula, like all the rest, leaves to the man who wants a machine

an opportunity of making his values either high or low.

Mr. Blackburn observes that "obsolescence, like the poor, is always with us," but not always recognized. A company's ledger sheets do not show the status of obsolete equipment. Depreciation charges are set up monthly or yearly, but probably only a few plants set up obsolescence accounts. Depreciation is something with which industry always has had to contend, whereas obsolescence is a comparatively new experience. Depreciation is a gradual wearing out of equipment; obsolescence may come overnight with the advent of a new idea that has been developed to do the job better and at less cost. Amortization of machine tools in the ledger account has been thought of only as depreciation.

Machines today are worked harder, for longer hours, with less skilled operators and with less careful attention to their physical condition than ever before. On the other hand, machine tools are in the same class as automobiles. They are built with greater structural strength, to closer limits of accuracy and with hardened alloy-steel gears and shafts, anti-friction bearings and automatic lubrication.

Scheduling Obsolescence Over a Five-Year Period

How can the accounting department be sold the idea that it should use with the depreciation percentage a factor of obsolescence on certain types of machine tools? Is the answer a replacement reserve whereby tools would be classified accurately and with some judgment and be depreciated according to the government allowance, adding 10, 15, 25 and 50 per cent for obsolescence? Mr. Blackburn remarks that the answer probably is to be found in the plan of a large machine tool user who establishes a classification and a schedule of obsolescence for a five-year period. If the history and status of machine tools in a plant are available, the simple way is to use not a formula, but common sense, not estimates of quantities submitted as a theoretical problem, but concrete facts taken from the schedule of performance and results. With this information, obsolescence forecasts together with simple formulas to check our findings will go a long way toward relieving our industries of equipment that has become a liability rather than an asset.

If the machine tool builder can develop special machines which can be changed within certain limits without completely rebuilding the old machine, he will create a large volume of business for himself and will decrease the cost for the user of his equipment until the factor of obsolescence would again become of lesser importance. This is his biggest problem today, according to Mr. Blackburn, who likewise sounds the warning that to go too far in obsolescing equipment is just as easy as it is not to go far enough. A safe formula would be to buy new machinery only when it costs money not to buy. Then set about to prove it. For this problem to be successfully solved will take the coordinated effort and cooperation of accounting, designing and manufacturing departments and the machine tool builders.

In the discussion which followed the presentation of the paper, E. F. DuBrul, manager, National Ma-

chine Tool Builders' Association, who presided at the session, said that shop men are too prone to forget the importance of figures. The shop executive cannot see everything going on in his plant, but the accountant can give him figures, correctly compiled, which enables him to know the status of affairs in his entire establishment. In an attempt to find the best formula for ascertaining the time to replace old equipment with new, he pleaded for cooperation between the engineering societies and the associations of equipment manufacturers.

He referred to the standard cost system devised by his association, stating that it specifies 130 hr. a month as the standard working time for machine tools. Adoption of this schedule gives management the opportunity to spot immediately a machine which is not running full time and to find out why.

If the automobile industry wants a guarantee of production from the builder of machine tools when a proposal is submitted, Frederick B. Heitkamp, Cincinnati Milling Machine Co., Cincinnati, suggested that the industry confine its dealings to reputable machine tool companies. He presented a chart of machine tool orders showing the curve over a period of years, comparing it with a second chart for the corresponding years on which appeared a much more violently fluctuating curve representing the automobile industry's orders for machine tools. These contrasting charts pictured the difficulties which the machine tool industry faces in keeping its production equipment ready to meet suddenly developed peak demands.

Others participating in the discussion included Mr. Brussel, co-author of the paper; Charles D. Oesterlein, Oesterlein Machine Tool Co., Cincinnati, and W. E. Smith, Wesson Sales Co., Detroit.

Butt-Weld Attachment for Cantilever Girder

CHANGES made in the plans after the main framing had been completed for the Deutsche Museum, Munich, Germany, gave rise to an unusual method of attaching some of the main girders in cantilever fashion beyond the columns to which they were framed. Welding was resorted to, as described by *Bauingenieur*, as the nature of the framing would have made a riveted splice awkward. I-beam girders 18 in. deep are here supported by columns consisting of two 14-in. channels spread sufficiently apart to let the I-beam pass between. Top and bottom angle brackets attach the beams to both flanges of the columns, making a firm joint.

Anticipated loading on the cantilever extension was figured to give a stress at point of connection of 12,000 lb. to the square inch. The girder ends were prepared for welding by beveling top faces of both flanges to a 40-deg. angle (80-deg. included angle), and similarly beveling both sides of the web. Welding was done with the cantilever extension supported on scaffolding. The web was connected by a single layer weld on each side, but the flanges required as much as four layers.

After welding, a load test producing a 26,000-lb. stress was made without bringing out any evidence of distortion.



EDWARD PAYSON BULLARD
1841 - 1906
FOUNDER
THE BULLARD COMPANY
HIS GENIUS AND FORESIGHT
STILL GUIDE OUR PROGRESS

Bullard Company Celebrates

chine design. Combined with this mechanical aptitude he had inherent business ability, and one of his early experiences in merchandizing was in disposing of machinery and equipment obtained from an arsenal just after the close of the Civil War. Later he established a machinery business with headquarters in New York, and while in this business he recognized the demand for a high-grade lathe. Accordingly he decided to manufacture machines of his own design. This decision marked the beginning of the Bullard Co.

Development of these lathes, some of which are still in existence, was followed by the adaptation of the vertical boring mill principle to smaller machines of the vertical

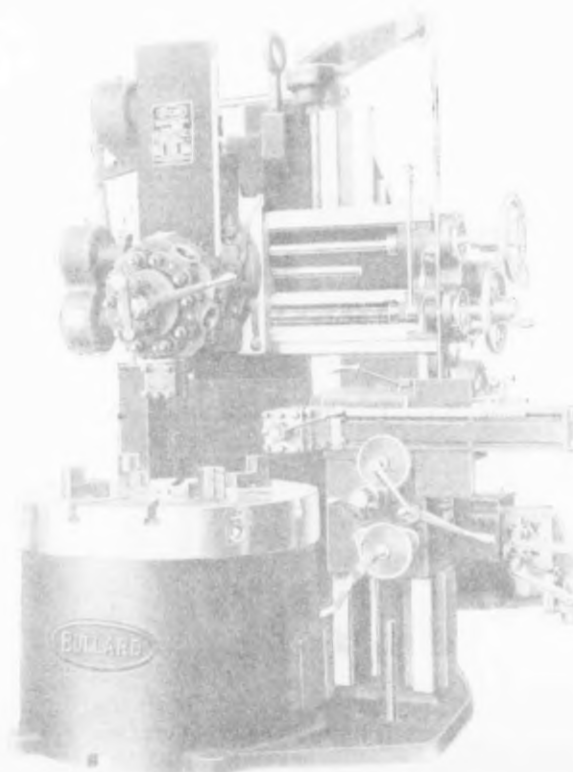
type having a wide range of adaptability and flexibility of tooling. The success of these designs is reflected in the fact that for almost a quarter of a century the company has concentrated on production machines incorporating the same general principles.

With the death of Mr. Bullard in 1906, the tradition and future of the company that he founded were left to his sons, who received their training under him. In their hands the designs of the founder have been further developed, and the vertical turret lathes and the Mult-Au-Matic and Contin-U-Matic multiple-spindle equipment built by the company have found wide application in meeting mass production problems. Underlying the

CELEBRATION of the fiftieth anniversary of the Bullard Co., recently, was marked by the hanging of a portrait of Edward Payson Bullard, the founder, in the main lobby of the company's new administration building at Bridgeport, Conn.

The company was established in 1880 under the name of the Bridgeport Machine Tool Works. In 1894 it was incorporated as the Bullard Machine Tool Co., and in 1929 took its present name, the Bullard Co.

Born in 1841, Edward Payson Bullard at the age of 17 entered the Whitins Machine Works, Whitinsville, Mass., as an apprentice; after completing his apprenticeship he worked at the Colt Armory and subsequently at the Pratt & Whitney Co., both of Hartford, Conn. A typical New Englander, alert and practical, he took advantage of every opportunity to add to his knowledge of mechanical principles and practices, and soon became recognized for his ability in ma-



Fiftieth Anniversary

EDWARD PAYSON BULLARD'S contribution to the progress of the metal-working industries has proved to be of fundamental character. Not only do his mechanical conceptions live in the products of the company he founded, but his tradition of fair dealing continues as an active policy of his successors.

development of these multiple-spindle continuous production machines was not only a knowledge of efficient mechanical construction, but comprehensive understanding of the principles of manufacturing as well. Thus, the Mult-Au-Matic has been referred to as a "manufacturing method" rather than as merely a machine.

In keeping with the progress in metallurgy, gear design, lubrication and other details, the machines have undergone a gradual refining process, and in this Bullard engineers have made original contributions through their own research laboratories.

There is now prominent in the organization the third generation of the Bullard family. Several of the present factory personnel started work under the founder of the company, whose humanity and fair dealing have been continued as a definite policy. This is reflected in the statement of principles in the Bullard organization, which reads:

"First, that respect and confidence between employer and employees shall be established and maintained; second, that a profitable and equitable incentive must be provided for both; third, that there must be established a measure for determining a rate of wage; and fourth, that the rate of wage must be definitely related to energy, skill, experience and knowledge required to perform the work."

These constitute a working basis for personnel relations that have been eminently satisfactory. While the channels of communication from the humblest sweeper to the president have been kept wide open, it is to be noted that the personnel policies lack any suggestion of a paternalistic attitude that would sap the dignity and the independence of either party.

Apart from the building of machine tools, an interesting chapter in the company's history is its World War record. The Bullard organization was

authorized to construct and equip a plant for the manufacture of 155-mm. guns of the French model field piece. The plant was built in record time, the equipment purchased and installed rapidly with only meager information on which to work, and the guns produced by methods new in gun making and with an efficiency that

Rapid Electric Welding of Pipe

Another method of electric welding of pipe, developed in England by a Norwegian engineer, has come to the front. Its characteristics are said to be rapid production and the ability to use hot-rolled stock, such as skelp, sheets or strip, without any need to make special preparation of the edges. Another feature is reported as the ability to make thin-walled pipe without distorting the shape.

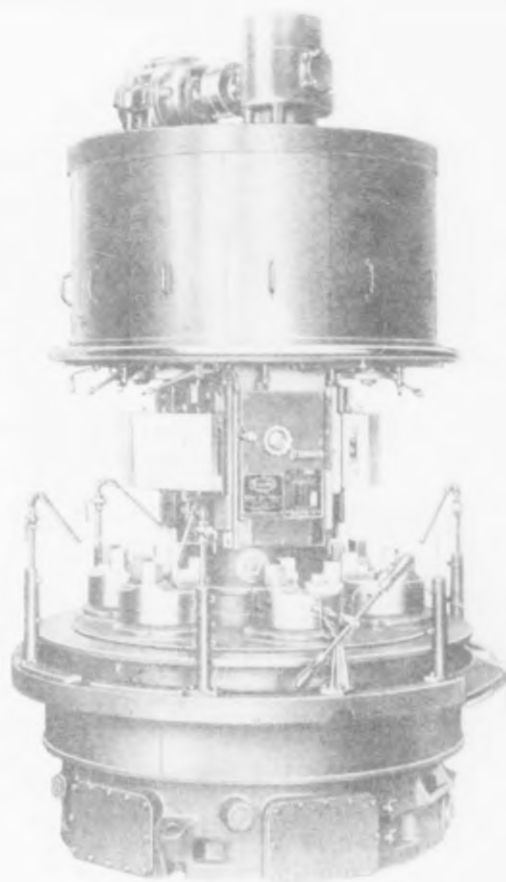
This process, on which the American rights are controlled by Julius L. Sussman, 3701 Woolworth Building, New York, is being offered for non-exclusive license. If it is taken up in this country as has been the case in England it will come into competition with a number of processes already in vogue here. Included in this list are the Parpart, or Standard process, the Johnson, or so-called Republic process, the arc process employed by

surpassed established arsenals. At the close of the war this gun plant became the main unit of the company's plant. In 1929 the company was changed in form from a closely held corporation to one having widely distributed stockholders, and the name was shortened to the Bullard Co., indicating wider activities.

the A. O. Smith Corp., the induction process operated by the Youngstown Sheet & Tube Co., flash process of the National Tube Co., the lap-weld process and the direct-current process.

Operation is fully or semi-automatic. If fully automatic the flat stock starts at one end, which may be taken from a reel or coil, such as that in which strip is customarily shipped. Thence this material enters a machine or succession of machines with a total length of about 80 ft., at the end of which the finished pipe cut to length, drops on a truck, ready for threading.

Heating is progressive after the tube is mechanically formed. This progressive heating is obtained by a series of single electrical contacts and results in giving the entire body of steel a uniform temperature all around the circumference, progressing from a dull red until it reaches a white heat. At this point pressure is applied to the abutting edges and, thus, with a minimum of pressure, welding is performed.



Grinder for Vertical Rolls of Universal Structural Beam Mill

MACHINES for grinding the vertical rolls of a universal mill for rolling heavy H-beams were installed recently by the Farrel-Birmingham Co., Ansonia, Conn., in the new beam mill of the Illinois Steel Co., South Chicago.

The rolls for which the machine was designed are 42 in. in diameter, have an 18-in. face and a contour combining taper and curve. The middle portion on the face is ground with a true radius and the sides with a straight taper, usually either 4 or 8 deg. The grinding machines developed for the work will grind rolls with a taper up to 12 deg. and also cylindrical rolls.

Arrangement of the machine may be seen in the illustrations. The swivel table mounted on the carriage is provided with a hardened steel ball race having balls of substantial diameter. The pivot pin is equipped with a Timken bearing and lubricating pad. The swivel table is reinforced at critical points, and a broad rib between the bearing surfaces of the head and tailstocks aids in stiffening the table. The carriage is carried on inverted vee-ways lubricated by an oil bath.

The swivel table is extended with a long lever arm equipped with a nut that is adjustable along that arm for a distance of about 3 ft. This nut has a lever extending to another arm equipped with a similar nut adjustable for the same distance as on the swivel table extension. The latter arm is one arm of a bell-crank. The other arm of the bell-crank is connected through links to a nut moving on a screw parallel to the axis of the roll. The bell-crank itself is mounted on the carriage and the arm that is connected through the linkage to the nut on the screw is equipped with a roller which travels along a slot parallel to the axis of the roll. A portion of one wall of this slot is broken away.

In operation, the nut for traversing

the carriage moves along a screw connected by linkage with the bell-crank. The roller of the bell-crank, being in the slot, prevents the bell-crank from rotating so that the whole carriage, including the swivel table, moves in a direction parallel to the axis of the roll, until the roller of the bell-crank comes to the opening in the wall of the slot. The resistance of the entire carriage moving on the ways being greater than the resistance of the swivel table to rotation, when the roller comes to the slot opening, the whole carriage stops. The bell-crank then swivels until the roller comes in contact with the opposite wall of the slot, when further rotation of the swivel table is prevented and the whole carriage moves forward again. Rotation of the bell-crank rotates the swivel table through the linkage connecting the arm of the bell-crank to the arm of the swivel table, the angle through which the swivel table moves being adjusted by moving the nuts in the swivel table arm and the bell-crank arm away from or into the center of rotation.

Carriage traverse is by means of a single inclosed worm gear reduction, and the traverse screw and the cross-head which contains the nut connected by the linkage to the bell-crank arm. This mechanism is driven by a direct-current variable-speed, reversing motor.

The headstock is of dead-center type, the faceplate being driven by

means of a pair of double helical gears and a worm gear reduction. The grinding runs in oil. The tail-stock has sidewise adjustment and is equipped with a roll face indicator to locate the roll central with the carriage pivot.

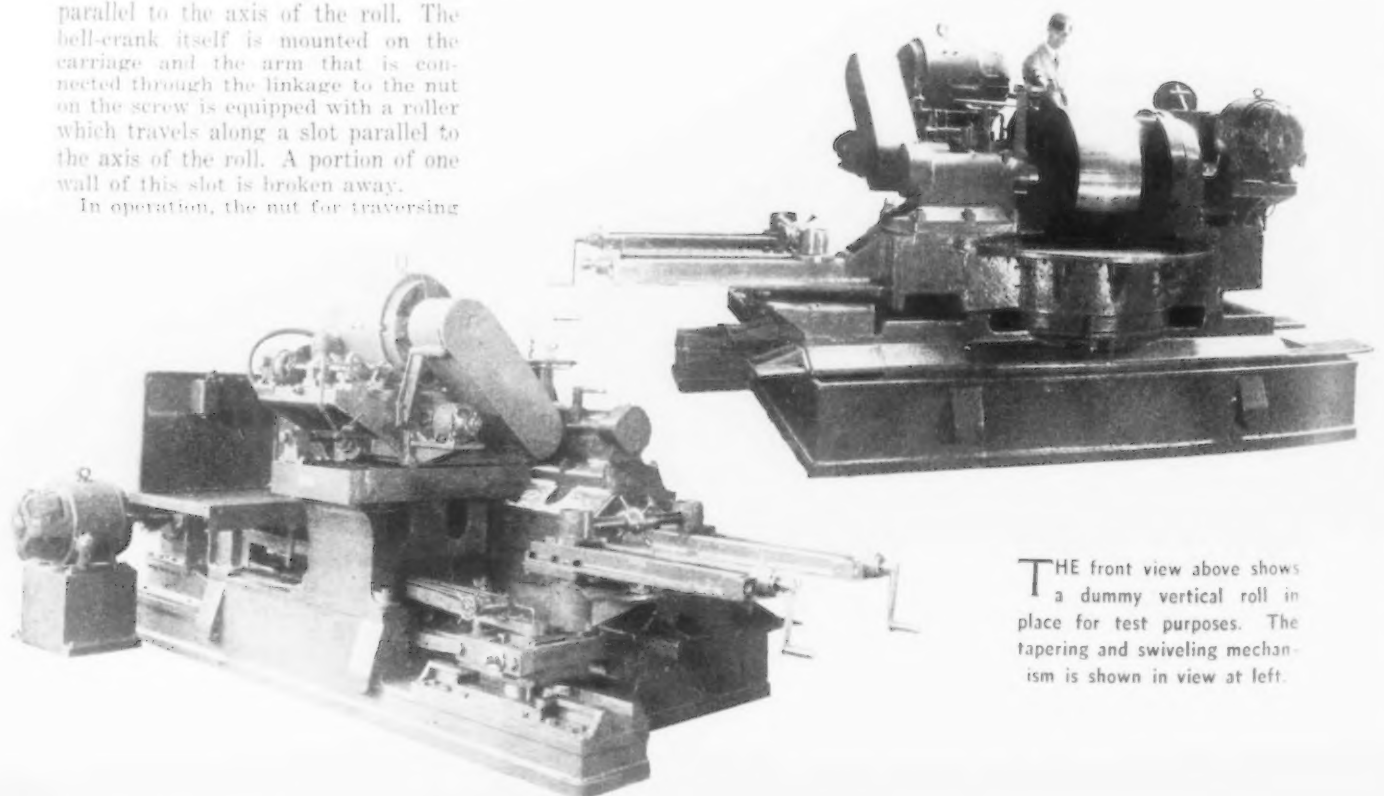
The grinding wheel is 30 in. in diameter, has a 3-in. face and is mounted on a heavy spindle of standard Farrel construction, with a lubricating system independent of all other lubricating systems on the machine. The grinding wheel unit is provided with both hand and motor-operated feeds. The drive from the motor to the wheel-spindle is by multiple V-belts. Wheel speeds range from 575 to 1150 r.p.m.

Soft-Headed Hammer for Machinists' Work

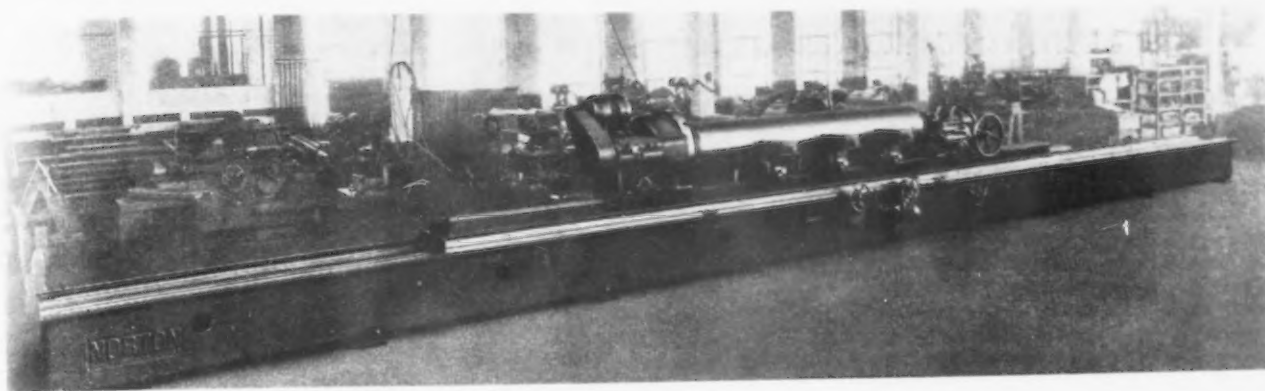
A LEAD hammer developed by the Bunting Brass & Bronze Co., Toledo, Ohio, is made in the 2½-lb. size and is securely assembled to a 10-in. steel handle. A more perfect balance and a superior metallurgical composition of the head are claimed for it.

This new hammer supplements the line of copper-bronze hammers of the Bunting company, whose metallurgists have spent considerable research in the development of soft metal hammers for use in operations where steel or iron machinists' hammers may not be used safely.

Virginia Iron, Coal & Coke Co., Roanoke, Va., reports a net loss for 1930 of \$36,531.



THE front view above shows a dummy vertical roll in place for test purposes. The tapering and swiveling mechanism is shown in view at left.



Grinder 57 Ft. in Length to Be Used on Large Press Rams and Columns

WHAT is believed to be the largest grinding machine with a traversing table will be installed at the Eddystone plant of the Southwark Foundry & Machine Co., Philadelphia, for use in grinding the rams and columns of mammoth hydraulic presses.

Work up to 36 in. in diameter, 288 in., or 24 ft., in length, and weighing up to 40,000 lb. may be ground. In permitting finish grinding direct from rough turning, the machine effects a saving over the former method of finish turning and polishing. It will grind to a mirror finish, and the accuracy is said to be easily within 0.0005 in. for concentricity and straightness. Its production rate is several times that of the average cylindrical machine of medium size; in a trial it removed stock from a large cast-iron column at the rate of 6 cu. in. per min.

The machine was built by the Norton Co., Worcester, Mass., and in fundamentals it is similar to all Norton cylindrical grinding machines. Rigid construction, to eliminate vibration arising from tremendous weight of the work being ground and the great length of the machine, is a feature. The work is driven by a headstock, which in this case has a live spindle 10 in. in diameter, supported by ball bearings that are 16½ in. in diameter. At the headstock the work is carried in a chuck and at the footstock on a regular center. These centers, of special alloy steel, are 4½ in. in diameter and 24 in. long. The headstock and footstock are adjustable along a massive work-table, which weighs, finished, 16,448 lb. The table was cast in one piece to assure maximum rigidity.

The massive wheel-slide is supported by large ways, one flat and one Vee, which are provided with "one shot" lubrication. Movement of the slide is through a large feed screw and half nut which have been lapped together and act as an immense micrometer. In spite of the great weight of the table, the wheel-slide mechanism

can be adjusted in position within 0.000125 in. Provision is made for moving the wheelslide in and out rapidly by power.

The 57-ft. base is made in three sections and weighs 36,755 lb. When the center and largest portion, 25 ft. long, was cast, the rough casting was

less than 3/16 in. out of its greatest divergence from a straight line. However, more than a ton of metal was removed from the three sections in planing.

The machine is provided with unusually large steady rests; they have a capacity of 30 in. diameter. There is an interlocking device on the table-drive mechanism. Twelve speeds are provided for the work table. A 30-hp. motor is required for the wheel and table traverse and 20 hp. for the headstock.

Starter Frames Welded Automatically

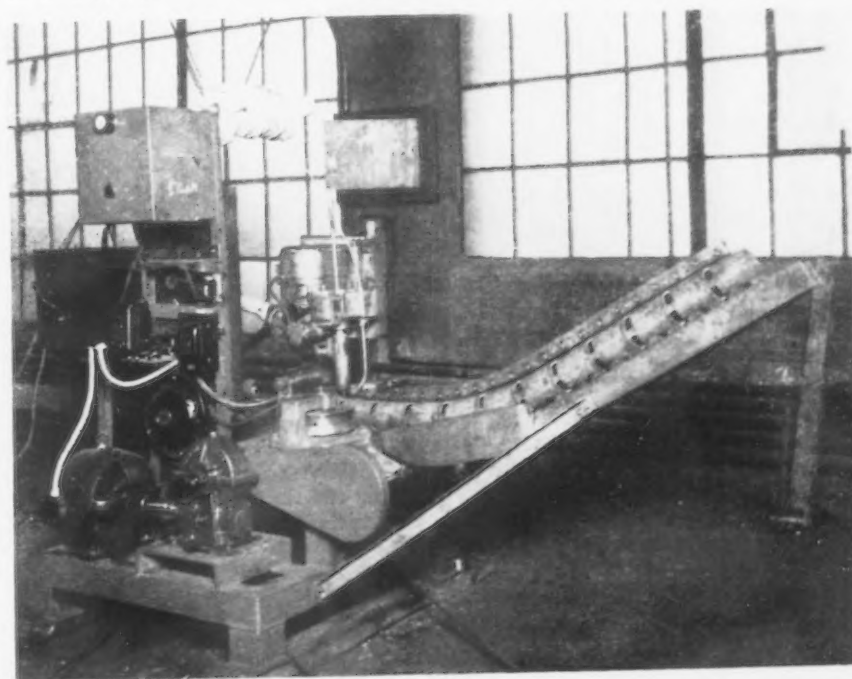
FOR welding automobile starter frames, the Lincoln Electric Co., Cleveland, has developed an automatic machine which embodies the principles of the shielded arc and utilizes the "electronic tornado" process.

The starter and generator frames for which the machine was designed are usually of 5/16 or ¾-in. plate. After being cut to size and shape, the plate is punched and then rolled into cylinders. These cylinders are fed into a gravity conveyor as illustrated, being guided automatically so as to keep the seams on top. At the

bottom of the conveyor, they go between two rolls which squeeze the seams together tightly as they pass under the arc.

No filler rod is used, the two edges of the seam being fused together.

The machine has a capacity of approximately 240 frames an hour, and one man and a helper can operate four machines simultaneously. With average cost of labor and material, the cost of welding frames will, it is said, in general, approximate one-half cent each. The shielded arc produces a high tensile and ductile weld.



Pneumatic Hand Filer Has Finger Speed Control

THE Kipp air filer is a new number in the list of pneumatic tools developed by the Madison-Kipp Corp. of Madison, Wis. It operates at speeds from 500 to 5000 strokes per minute, depending upon the amount of air admitted by the operator's trigger valve.

Many different-shaped files are available and can be quickly inserted and removed by the operator to suit his work. They are held by means of a hand-operated collet at the end of the spindle.

A pistol grip gives the filer a natural position in the hand, and the filer may be held for operation in any position. The air cushion piston is said to eliminate vibration from the reciprocating action, providing smooth cutting strokes.

Madison-Kipp tool makers have found this tool to be suitable not only for filing work, but also for honing and other operations where rapid



strokes of approximately $\frac{1}{4}$ in. are desired. Its field is primarily in metal work, but special applications can be made for woodworking. As an example, a saw may be attached for hand-scroll work.

Air, under pressures of from 30 to 100 lb., enters the filer through a hose connected with the pistol grip. This air is controlled by a trigger valve, which when pressed admits air to a rotary valve which is die cast into an air turbine. The position of this rotary valve is always such that the air, under pressure, will first flow to either end of the piston cylinder. This drives

the piston forward or backward, as the case may be, through half a cycle, and covering the exhaust port. This exhaust port is connected to the nozzles of the air turbine. The exhaust air drives the air turbine attached to the rotary valve. The rotary valve, turned by the turbine, directs the air supply first to one side and then to the other side of the piston so that the cycle is completed and automatically repeated.

The motion of the piston not only valves the exhaust port, as described above, but, being part of the spindle, the pulsating energy is transmitted to the file.

The piston is air cushioned at both ends of the cylinder. The speed of the piston is fixed by the speed of rotation of the turbine—that is, one turn of the turbine means one turn of the rotary valve, and a forward and backward movement of the piston. In other words, when the r.p.m. of the turbine are 5000 there will be 5000 forward and backward strokes of the piston, which means 5000 cutting strokes to the file per minute. The weight of the Kipp air filer is $1\frac{1}{2}$ lb.; the length is 7 in.

Welded Steel Permanently-Inclined Power Presses

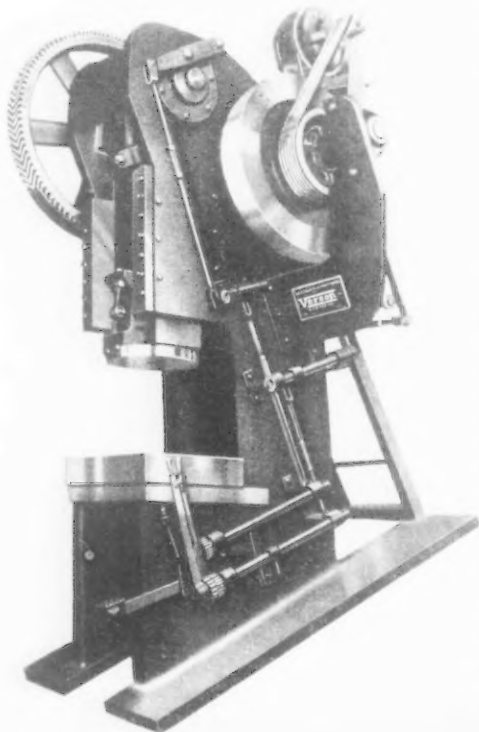
OVERHANGING - TYPE permanently-inclined machines made of rolled steel plate cut to size by the oxy-acetylene torch and are welded into units have been added to the line of Verson all-steel presses built by the LaSalle Machine Works, 3013 LaSalle Street, Chicago. Ram and gages, as well as the frame, are of this

construction, which is emphasized as providing unusual strength.

The 250-ton capacity press illustrated has an $8\frac{1}{2}$ -in. crankshaft, 10-in. stroke and 14 in. depth of throat. Main bearings are bronze bushed and the gibs are of steel with bronze lining. The backshaft, balanced flywheel and the flywheel support are mounted in Timken roller bearings. Annular ball bearings are supplied in the pinion support.

The roller-bearing multiple-disk friction clutch is equipped with an au-

tomatic safety stop designed to disengage at the top of the stroke. An auxiliary hand lever device provides for disengaging the clutch instantly at any point of the stroke. When the clutch is disengaged, the flywheel is the only moving part of the press, a feature which makes for quieter operation. The herringbone backgear and pinion also add to the quietness of operation. Texrope motor drive is furnished and lubrication of working parts is by means of a One-Shot fluid grease system. The weight of the No. 8 machine here shown is 30,000 lb.



Device for Pulling Gears and Wheels from Shafts

THE improved "Steelgrip" universal gear and wheel puller recently brought out by Armstrong-Bray & Co., 666 Eagle Street, Chicago, is designed for pulling small gears, wheels or pulleys, even those located a considerable distance in from the end of the shaft. Ease of operation and adaptability for use in awkward places are features emphasized.

The device is regularly equipped with three chains 3 ft. long, but longer chains can be furnished. The screw is of ample size and is made of chrome-nickel steel and has a hardened point. The pulling power of the gear puller illustrated is approximately 4 tons, while that of the No. 4 heavy-duty puller recently made available by the company is more than 12

tons. The latter is for large and heavy work and is equipped with three $\frac{1}{2}$ -in. chains 5 ft. in length.



Develops Apparatus for Testing Load Capacity of Lubricants

FOR testing the load-carrying capacity of lubricants, the Timken Roller Bearing Co., Canton, Ohio, is furnishing the equipment illustrated. This apparatus, developed originally for the company's laboratory, is offered for use in industrial plants, power plants or wherever it is necessary to determine the efficiency of lubricants for given conditions of service. It can also be used to determine the relative efficiency of dif-

ferent bearing metals under various conditions of load, speed, temperature, or with different lubricants.

fractional horse-power motor. It is mounted in two Timken bearings, and is tapered at the test end to receive the tapered cup of a Timken bearing. This cup, which forms one of the test pieces, is held in place firmly by a nut on the end of the mandrel.

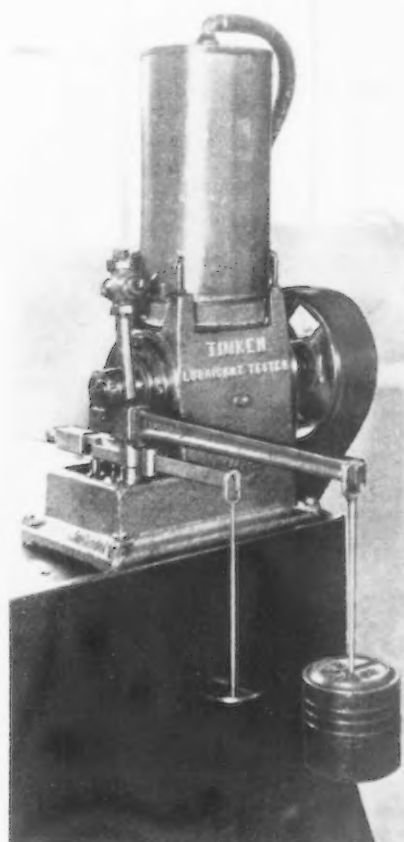
The lever system, which is the most important part of the device, consists of two levers, one above the other. The upper is called the load lever and the lower the friction lever. The upper lever, which carries the test block, is pivoted on a knife edge, mounted in the lower lever. The latter is also pivoted on a knife edge and is provided with a stop at the unloaded end. Thus the test block is always parallel with the revolving cup and the unit loading over the length of both pieces is always constant.

The test block is a small piece of hardened and ground metal inserted in a notch in the loading lever and held in place by a wedge. In case bearing metals are to be tested, the test block or the cup, or both, can be made of the appropriate material. The friction lever is provided with a ver-

nier scale and a sliding weight for obtaining accurate measurements.

Operation of the device is as follows: With both test pieces in place, the driving motor is brought up to desired speed, and lubricant heated to the required temperature is permitted to flow over the test block. Weights are then applied to the loading lever until the desired unit pressure is obtained between the test pieces. A chart is furnished which gives the necessary weights on the loading lever per 1000 lb. of unit pressure. If only the load-carrying capacity of the oil is to be determined, the test block is removed after 30 min. running, and examined for signs of scuffing. The degree of scuffing determines the relative load-carrying capacity of the lubricant.

When the coefficient of friction of the lubricant is to be determined, weights are added to the friction lever until it moves away from the stop. Loading the upper lever causes the friction on the test block to move it forward horizontally, unbalancing the friction lever until it rests on the stop. This condition is compensated for by adding the weights on the friction lever until the system is again in balance and the lever is off the stop. The coefficient of friction of the lubricant is then calculated from the weight it takes to balance the levers.



ferent bearing metals under various conditions of load, speed, temperature, or with different lubricants.

Simplicity, both in respect to construction and operation, is a feature. The apparatus consists of a cast-iron base that supports the testing mandrel, two levers and a container holding about 1 gal. of the lubricant to be tested. An electric heater beneath the tank serves to heat the oil to any temperature up to 210 deg. The oil flows by gravity from the tank, over the test piece and to a sump in the base, the rate of flow being adjusted by a valve. From the sump, the oil is returned to the tank by means of a small pump which is located in the base and belt driven from the testing mandrel. This mandrel extends through the base, and may be either direct or belt driven by a variable-speed

Reamer Grinding Machine

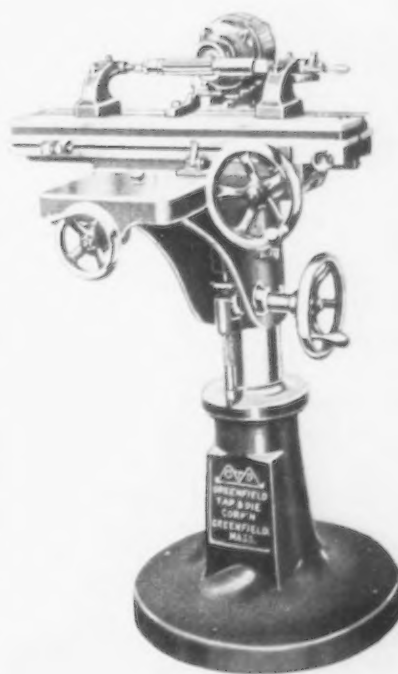
A FEATURE of the No. 4-R motor-driven reamer grinder recently brought out by the Greenfield Tap & Die Corp., Greenfield, Mass., is that by the use of attachments the machine can be adapted to perform all operations of a universal cutter and reamer grinder, including cylindrical and internal grinding.

Base and column are made in one casting to provide rigidity. The knee is broad and has a long bearing on the column to which it is splined. The sleeve of the elevating hand-wheel is provided with 0.001-in. graduations. Movement of the cross-slide is by means of a feed screw which is also graduated in 0.001 in. Longitudinal movement of the slide, which has flat and vee ways, is obtained by means of a hand-wheel through a rack and pinion. Adjustable stops or dogs provide for limiting the stroke of the slide for shoulder work; they also prevent the wheel cutting into the shank of a reamer.

Vertical as well as horizontal movement for the work table is another feature. The full length of the table rests on the longitudinal slide upon which it swivels. It has a screw adjustment for swiveling for taper work, and for these settings graduations representing a taper of $\frac{1}{4}$ in. per ft. are provided. The wheel spindle is integral with the inclosed motor and revolves in large ball bearings. The entire wheel-head can be swiveled to any desired angle relative to the

table, and suitable graduations facilitate making these settings.

Specifications include: Distance between centers, 21 in.; swing over table, 6 $\frac{1}{4}$ in.; length of table travel, 19 in.; cross-feed, 6 in.; vertical feed, 8 in.; and distance from center of wheel-spindle to table at its lowest position, 8 $\frac{1}{4}$ in.



Railroads Installed 76,909 New Freight Cars in 1930

WASHINGTON, Feb. 3.—Reflecting a reduction of 7985, new freight cars installed in service by the American railroads last year totaled 76,909, against 84,894 in the previous year, according to reports just filed by the carriers with the Car Service Division of the American Railway Association. The 1930 installations, however, showed an increase of 18,514 over those of 1928 and 1523 above 1927.

The 1930 total is made up as follows: Box cars, 40,042; coal cars, 27,911; refrigerator cars, 3974; flat cars, 3668; stock cars, 913; miscellaneous, 401.

New freight cars on order Jan. 1 of the present year totaled 9821, of which box cars totaled 4357; coal cars, 3278; refrigerator cars, 1543; stock cars, 500, and flat cars, 143. On Jan. 1, 1930, the railroads had 34,581 freight cars on order.

In 1930 the railroads installed 782 new locomotives, against 762 in 1929 and 1390 in 1928. New locomotives on order Jan. 1, 1931, totaled 129, compared with 431 on Jan. 1, 1930.

Copper, Lead and Zinc Mining in 1930

Figures showing smelter and refinery output of copper, lead and zinc in the United States in 1930 have been issued by the United States Bureau of Mines. Smelter production of copper from domestic ores in 1930 was 687,500 net tons, and the refinery production of new copper from domestic and foreign sources was 1,115,000 tons.

Output of primary refined lead from domestic sources in 1930 was 569,000 net tons and from domestic and foreign sources 641,000 tons.

Smelter output of primary zinc from domestic ores in 1930 was 491,100 net tons and from domestic and foreign ores, 499,300 tons. All figures in the table are of estimated recoverable metal output of the mines, and should not be confused with figures of smelter and refinery production.

Output of recoverable copper by United States mines in 1930 was about 682,600 net tons, or about 32 per cent less than the 997,549 in 1929.

Recoverable lead contained in ore mined in the United States in 1930, exclusive of Virginia and New York, was about 542,450 net tons, a decrease of 16 per cent from the 647,993 tons in 1929.

Recoverable zinc contained in ore mined in the United States in 1930 was about 600,910 tons, compared with 724,483 tons in 1929, a decrease of 17 per cent.

Steel Barrel Production 45 Per Cent in 1930

WASHINGTON, Feb. 3.—The production of steel barrels in 1930 totaled 7,440,998 units, representing 45 per cent of capacity, compared with 8,337,999, or 57.1 per cent of capacity, in 1929, according to reports received by the Bureau of the Census from 27 companies, operating 32 plants. Shipments last year amounted to 7,434,371 barrels, against 8,317,581 in the previous year.

The output in December was 412,283 barrels, or 30.3 per cent of capacity, against 497,539, or 36.5 per cent of capacity, in November. Unfilled orders at the end of December for delivery within 30 days totaled 188,902 barrels, compared with 230,960 at the end of November. Orders for delivery beyond 30 days totaled 1,248,171 at the end of December, rising from 698,085 at the end of November.

By-Product Coke Output Smallest Since 1927

WASHINGTON, Feb. 3.—The smallest of any month last year, the output of by-product coke in December was 3,077,290 net tons, or at the rate of 99,267 tons a day, according to the Bureau of Mines. This compares with 3,137,110 tons, or 104,570 tons a day, produced in November, indicating a decrease of 1.9 per cent in volume, but 5.1 per cent in the daily average. The production of beehive coke in December is estimated at 171,100 tons, an average of only 630 tons a day.

The total production of by-product coke in 1930 was 45,514,508 tons, while the beehive output was 2,700,800 tons, according to preliminary figures. The by-product output was the smallest since 1927, when it was 13,884,726 tons and 19.3 per cent under the 1929 record figure of 53,411,826 tons.

The proportion of by-product coke as related to the total, however, rose in 1930 to 94.2 per cent from 93.2 per cent in 1929, the beehive output last year having been only 5.8 per cent of the total and the smallest since 1880.

The only States showing increased production of by-product coke in 1930 over 1929 were Massachusetts and West Virginia, with 935,900 tons and 1,479,900 tons respectively, increases of 20.5 per cent and 3.4 per cent. Pennsylvania, the leading producer, showed an output of 12,650,100 tons, a drop of 1,839,183 tons, or 12 per cent under 1929. Indiana ranked second with 4,946,500 tons, a decrease of 1,508,878 tons, or 23.4 per cent, and Illinois was third with 3,574,200 tons, a decline of 629,916 tons, or 15 per cent.

Last year, 46 plants connected with iron furnaces produced 33,503,300 tons, or 73.6 per cent of the total by-product output.

Preliminary figures indicate that the recovery of by-products from coke oven operations in 1930 consisted of 578,034,000 gal. of tar, 1,461,015,000 lb. of ammonia; 710,129,000,000 cu. ft. of gas and 172,955,000 gal. of crude light oil.

Stocks of coke at furnace plants on Jan. 1, 1931, amounted to 1,440,842 tons, an increase of 35.2 per cent over the 1,070,114 tons on hand Jan. 1, 1930.

Orders for Boilers Down in 1930

WASHINGTON, Feb. 3.—Orders were placed last December for 814 steel boilers with 587,053 sq. ft., against 777 with 709,322 sq. ft. in November, according to reports received by the Bureau of the Census from 81 manufacturers. Orders in 1930 totaled 13,166 boilers with 13,470,390 sq. ft., against 18,526 with 19,468,534 sq. ft. in 1929.

Mine production of copper, lead and zinc in the United States in 1929 and 1930, in terms of the recovered and recoverable metal content, in net tons (1930 estimated)

	Copper		Lead		Zinc	
	1929	1930	1929	1930	1929	1930
Eastern States:						
Central States:						
Tri-State district:						
Southeastern States:						
Upper Mississippi Valley:						
Michigan:						
Other:						
Western States:						
Arizona:						
California:						
Colorado:						
Idaho:						
Montana:						
Nevada:						
New Mexico:						
Oregon:						
Texas:						
Utah:						
Washington:						
Wyoming:						
Alaska (a):						
Total:						

(a) Figures obtained from the Geological Survey, Department of the Interior.
(b) Exclusive of total for Eastern States (principally Virginia) which Bureau of Mines is not at liberty to publish.

Steel Castings Had Value of \$196,591,693 in 1929

WASHINGTON, Jan. 29.—Steel castings produced in the United States in 1929 totaled 1,437,407 gross tons, so far as separately reported to the Bureau of the Census. The output was distributed as follows: For sale and for interplant transfer, 1,241,053 tons; produced and consumed in further manufacture in the same works, 196,354 tons. The total value of the production for sale and for interplant transfer was \$196,591,693.

Of the total output, 1,136,608 tons was contributed by establishments, 168 in number, engaged primarily in the production of steel castings and 300,799 tons by casting departments of steel works and of foundries and machine shops. The production of the 168 establishments engaged primarily in the manufacture of steel castings was distributed as follows: 1,095,011 tons; produced and consumed in further manufacture in the same works, 41,597 tons; value of production for sale and for interplant transfer, \$176,354,082.

Steel castings are also produced and consumed in the same works by establishments which are not required to report such production and consumption to the bureau, such as those engaged in the manufacture of motor vehicles, engines, pumps and agricultural implements. The total production as given in the report does not, therefore, represent the entire production of castings in all industries, but it does cover with substantial completeness the production of castings made for sale or interplant transfer.

(The American Iron and Steel Institute total of steel castings for 1929 was 1,583,040 gross tons.)

Second Largest Year in Iron Ore Imports

Imports of iron ore into the United States in December, at 175,920 gross tons, brought the 1930 total to 2,774,124 tons. This is second only to the large imports of 1929, at 3,139,334 tons. It exceeds the 1923 total, heretofore second largest, by about 6000 tons and is more than 150,000 tons ahead of 1927, which had been in third place.

December imports were more than double those of November, which totaled only 73,999 tons. With that exception, however, and the further

exception of June, they were the lowest not only for 1930, but for the entire period since October, 1928.

The year had maintained a lead over all preceding years until the end of September, at which time it was about 1 per cent ahead of 1929. In the last quarter, however, only 436,315 tons came in, against 825,210 tons in the last quarter of 1929, or almost twice as much.

Chile provided more than 60 per cent of the year's total—a slightly larger percentage than in 1929, although the quantity from that source fell off about 10,000 tons. There was a sharp drop in imports from Cuba, which declined two-thirds, and a sizable increase in imports from both French Africa and the unnamed countries. In the latter category the December tonnage includes 31,754 tons from Russia, which came in through the port of Baltimore.

Steel Castings Output 991,872 Tons in 1930

WASHINGTON, Feb. 3.—Bookings of commercial steel castings in 1930 totaled 884,433 net tons, or 51.1 per cent of the capacity of the 132 establishments reporting to the Bureau of the Census. Orders in 1929 aggregated 1,337,457 tons, or 76.5 per cent of capacity. Production last year amounted to 991,872 tons, or 57.3 per cent of capacity, against 1,353,118 tons, or 77.4 per cent of capacity, in 1929.

The 1930 production comprised 333,199 tons of railroad specialties, or 41.5 per cent of that kind of capacity, and 551,234 tons of miscellaneous castings, or 59.3 per cent of such capacity. The output consisted of 368,690 tons of railroad specialties or 45.9 per cent of such capacity and 623,182 tons of miscellaneous castings, or 67.1 per cent of that kind of capacity.

Orders in December were 49,387 tons, or 34.2 per cent of capacity, against 48,123 tons, or 33.3 per cent of capacity, in November. The December output was 46,290 tons, or 32.1 per cent of capacity, compared with 44,290 tons, or 30.7 per cent of capacity, in November. December orders consisted of 19,256 tons of railroad specialties and 30,131 tons of miscellaneous castings. The output comprised 14,197 tons of railroad specialties and 32,093 tons of miscellaneous castings.

Steel Barges Built in 1930 Took 34,400 Tons of Steel

Steel barges and other river craft launched during 1930 numbered 261 and required 34,400 tons of steel, according to figures reported annually to THE IRON AGE by the principal builders. This is the smallest number of launchings since the survey of this construction was inaugurated in 1925, and also represents the smallest aggregate tonnage of steel used for this type of work. In 1929, 480 launchings were reported, while steel consumption for this use amounted nearly to 80,000 tons. Gross registered tonnage of hulls placed in service last year amounted only to 86,000 tons, compared with 200,000 tons in 1929 and 155,000 tons in 1928. The average tonnage of steel per hull launched in 1930 also declined sharply from that of the previous year, amounting approximately to 130 tons. In 1929 the average was 170 tons, but in 1928, the year of the greatest number of launchings, the average per hull dropped to 120 tons.

The above figures were obtained from the same barge builders who have reported their tonnage in the past, and whose products are used principally for river commerce. The companies reporting are as follows: Alabama Dry Dock & Shipbuilding Co., Mobile, Ala.; American Bridge Co., Pittsburgh; Dravo Contracting Co., Pittsburgh; Howard Ship Yards & Dock Co., Inc., Jeffersonville, Ind.; Jones & Laughlin Steel Corp., Pittsburgh; Marietta Mfg. Co., Point Pleasant, W. Va.; Midland Barge Co., Midland, Pa.; Nashville Bridge Co., Nashville, Tenn.; Philip A. Rohan Boat, Boiler & Tank Co., St. Louis, Mo.; Ritter-Conley division, McClinton-Marshall Co., Pittsburgh, and Charles Ward Engineering Works, Charleston, W. Va.

The table covers the figures of these companies in the last six years:

Year	Number of Launchings	Steel Tonnage	Gross Registered Tonnage
1925	269	53,710	135,000
1926	366	63,776	160,000
1927	506	72,057	180,000
1928	523	62,443	155,000
1929	480	79,834	200,000
1930	261	34,400	86,000
Total	2,411	366,220	916,000

Mining and industrial electric locomotives to the number of 99, valued at \$879,345, were shipped in the last quarter of 1930, as against 116, valued at \$575,939, in the previous quarter, according to reports received by the Bureau of the Census from nine manufacturers, comprising practically the entire industry. Shipments in 1930 totaled 496 locomotives, valued at \$3,101,190, as compared with 825, valued at \$5,137,359, in 1929.

Continental Bridge Co. has moved its Chicago office from 53 West Jackson Boulevard to 343 South Dearborn Street. This company operates a fabricating shop at Peotone, Ill.

SOURCES OF AMERICAN IMPORTS OF IRON ORE (In Gross Tons)

	December		12 Months Ended December	
	1929	1930	1929	1930
Spain	6,500	—	81,012	48,585
Sweden	9,026	22,108	202,748	310,406
Canada	—	59	395	3,542
Cuba	—	51,600	190,654	641,359
Chile	167,283	186,438	1,689,071	1,629,066
French Africa	7,000	21,450	225,375	171,595
Other countries	46,111	5,000	384,869	264,090
Total	175,920	286,055	2,774,124	3,139,334

Heat-Treating Equipment for the Small Plant

(Concluded from page 465)

and a decided saving in material bills will be effected. Special care is required when the boxes are pulled from the furnace and the work is dumped into the quench while still at hardening heat.

When quenching from the pot is employed, the boxes should be dumped on a gridiron which retains the red hot parts and allows the compound to drop into a metal box. As soon as the parts have been quenched, a tight-fitting lid should be placed over the hot carburizer to prevent it from being burnt out by contact with oxygen in the atmosphere.

Old or spent compound, as it is commonly called, can be used to level up the hearth of a furnace while heating such parts as those of delicate section. The old compound will support the piece uniformly and prevent sagging out of shape in the furnace. The old compound is also used when fine tools are heated in closed boxes to prevent scaling and decarburizing, as there is sufficient carbon left in the compound to neutralize the effect of the furnace gases.

Shape and Size of Boxes

Carburizing pots or boxes, as they are called, are simple in principle but vary greatly in size and shape. The dimensions of these boxes should be such that a 2-in. space separates each box in the furnace. This is necessary for two reasons. In the first place the hot furnace gases must circulate freely in order to heat the furnace charge quickly. If the pots are jammed in tightly with little or no gas space, the effect is the same as attempting to heat a solid mass, equal to the volume of all the pots. It requires from 30 to 50 per cent more time to bring up to heat a furnace full of closely packed boxes than it does to heat a charge that is properly spaced.

The second reason for allowing space between boxes is the fact that, under heat, the boxes expand and grow in size from repeated heating so that a new set of boxes which fit tightly in the furnace will soon grow so large that they cannot be crowded into the furnace. It is not an infrequent occurrence for a tightly jammed charge to become "frozen" in a furnace, and as a consequence the furnace must be dismantled to get the charge out. Properly proportioned boxes eliminate this difficulty.

In another illustration can be seen a design of pot which is inexpensive and at the same time holds many long records for number of hours under heat. This type of pot or box has been used by the writer since 1910.

The distinctive feature of this pot is that the lid, A, is in fact the bottom of the pot. The pot is packed in the usual manner and the lid put in place. The pot is then rolled over on the packing bench just as a molder rolls a flask. The lid now becomes the bottom, with suitable skid strips on it to enable the pot to be shoved into the furnace easily, and also to permit the furnace gases to circulate under the pot. The illustration shows the flanged edge of this lid into which the pot, B, nests. The space between the flange and

the pot edge is filled with fire clay cement and the pot is ready for heating.

This method of sealing in the gases in the pot is a most effective one. In order for the gas generated by heating the compound to escape it must force its way downward through the closely packed compound dust and force out through the fire clay seal. This method of sealing is much superior in results to the other method of laying a piece of metal on top of the pot and expecting the fire clay seal to hold all the gas pressure.

A further advantage of the pot is the fact that the lids are durable and can be cast from gray iron as well as the pots themselves. The shape of the pot is such that the weight of the charge inside helps to keep the pot from bulging outward. In fact, the illustration clearly shows that the walls contract inward. A spacer bar, D, is shown in place in the opened pot which was used to prevent the side walls from closing in.

If these pots were made of high nickel-chrome material, they would weigh much less than the conventional design, because the lid carries the weight and requires most of the structural strength. Hence the cross-section of the pot could be as light as could be cast successfully.

Another illustration is a sketch of a pot and lid after this design. In this case the skid strips on the lid ran crossway to the length of the pot for some special reason. As previously stated, the writer has used this type of pot since 1910 and it is not patented in any way to his knowledge. Another illustration shows a sketch of the pot assembly as it would appear in the furnace.

Volume and Density of Metals in Casting

IN a paper published in the May, 1930, issue of the *Bulletin of the Association Technique de Fonderie* (Paris, France), J. Giustiniani discusses the origin of what he terms the "cold drop," or the solidified particles which float in all metals in fusion, and are visible as defects in castings.

If, in a quantity of iron in fusion, there is placed a piece of the same metal but cold, it will be found that the cold piece will float. On pushing this piece to the bottom of the receptacle, it rises immediately it is released. The cold piece of metal will still rise on repeating this operation for a second and third time; finally it melts, but leaves behind traces of its presence. The author has tried this experiment with steel and, although more dense, the result is the same.

Although in physics it is inadmissible that, of two bodies, the heavier could float on the lighter yet, in metallurgical practice, this exists as a fact. For explanation he suggests that (1) iron, in undergoing fusion, increases with the varying temperatures in volume and density, (2) that there is a simple increase in volume corresponding to dilatation of the metal. A quantity of iron, in contact with sufficient heat to cause fusion, dilates in proportion to the amount of heat absorbed, and at 1500 deg. C. the temperature for pouring, the dilation is total. On solidification the opposite takes place.

Output and Demand in Better Adjustment

BY LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

A DISTINCT upturn in our "composite demand line" occurred in December, the first since September. This is the first December rise in the barometer since 1925.

Chief factors in the rise were a spurt in the adjusted index of automobile production and in machine tool orders. Railroad freight traffic declined a little less than usual for the season.

On the other hand, building contracts (floor space) fell to a new low level. General manufacturing activity (excluding steel and automobiles) declined more than seasonally, and the same was true of mining and oil production. Agricultural purchasing power slumped badly. Exports of iron and steel fell sharply.

Net result: Indicated current requirements of the chief consumers of American steel were at the rate of about 77.8 per cent of the average for 1921-1927. This compares with 76 per cent in November.

Meanwhile, steel ingot production declined sharply, even after allowance for the usual seasonal decrease. It follows that progress was made toward adjusting production to requirements. The indicated discrepancy between the two was reduced.

Indications Are Well Mixed

In attempting to appraise the significance of these measurements, we find some points tending to confirm an optimistic interpretation, and some to the contrary. Thus, automobile manufacturers are generally believed to be proceeding cautiously with production schedules; if so, the rising trend of their output in November and December is not to be dismissed as a flash in the pan.

At least, it can be said that the December upturn in the composite demand line serves to check the rate of decline, and to give the impression that the downward momentum of the barometer is diminishing.

On the other side, we have to note that a ma-

jority of the items still pointed down in December. And it may be said that the recovery in automobile production is not entirely conclusive, being chiefly due to the activity of one manufacturer of low-priced cars, while the performance of others was very mixed. Light cars require less steel than the average. Moreover, railroad freight traffic in December did little better than hold its own, and the earnings of the carriers were so poor as to furnish little argument for large buying of equipment.

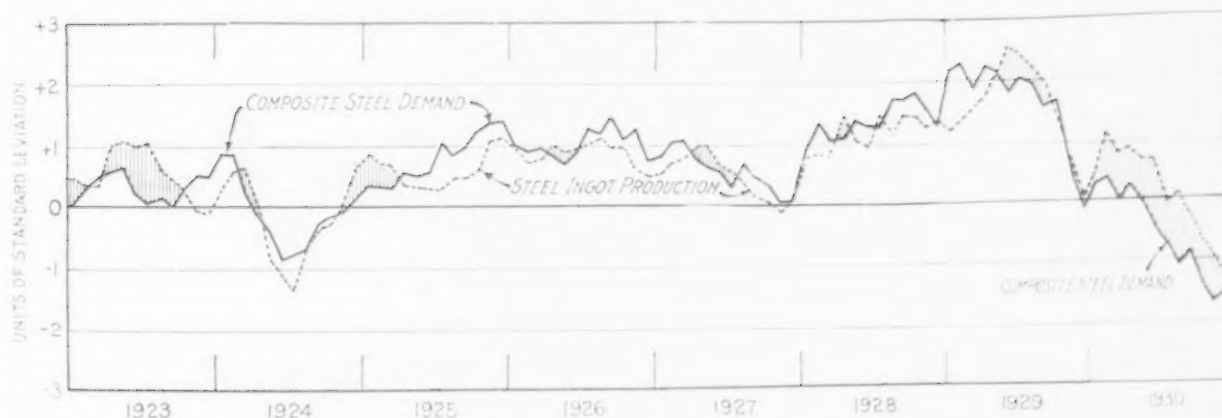
Nor, if we turn to precedent, do we find any strong reasons for concluding that this is the beginning of a sustained upturn in steel demand. Usually steel production falls below the level of the indicated requirements before the downward readjustment is complete. Usually, too, the demand line turns more deliberately—less sharply—at the final bottom.

May Be Start of Cyclical Rise

Probably the least satisfactory aspect of the situation is the fact that values and earnings are so generally depressed. Commodity prices, by their continued average weakness, indicate that demand is low in comparison with supply; and by the irregularity of their declines that the readjustment process is incomplete. Corporation earnings are greatly reduced, and the attempt to maintain wages makes less money available for plant, equipment, materials and supplies.

Yet, even so, factory payrolls are 25 per cent less than a year ago. The general purchasing power of the country is further reduced by an extraordinarily small farm income and a low purchasing power for the farm dollar.

The spurt in motor production helped the sale of sheets in December. Orders for locomotives showed a little improvement. But everywhere we turn—to farm, mine, factory or building, both here and abroad—we find little basis for increased demand or buying power in the current quarter.



Production is much closer to demand, but for real improvement it must fall below. Present indications call for an up-movement in the spring.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

Mass Production Not at Fault

IT is well to explode the "new era" conceptions that have been proved fallacious, but nothing is to be gained by condemning all of the ante-panic ideas as erroneous. Faith in the power of increasing production efficiency steadily to reduce costs and thereby make possible a broadening distribution of goods is as justified today as it was 16 months ago. Our present depression is no reflection on the merit of the machine or the genius of management. It is rather a result of too rapid acceleration of distribution through artificial inflation of consumer buying power. Securities speculation and instalment selling for a time supported a steadily increasing volume of production, which kept industry at high pitch from raw materials to finished product, but in the end they proved unsound and therefore temporary methods of expanding trade.

The obvious lesson is that there is no substitute for a genuine lowering in costs resulting in an actual gain in consumer buying power. Industrial managers and engineers now realize this truth and are applying themselves as never before to further cost reduction. Who is there, familiar with progress since the industrial revolution, who can question their success? The day of epoch-making scientific discoveries surely is not over. But, even assuming that no fundamental changes in processes or products are developed in the near future, management can be counted on to make further great strides in perfecting our present industrial equipment and organization.

Costs will be, and are being, reduced. Greater buying power will be built up on a solid foundation and will give support to mass production on an even larger scale than in the flush times that preceded the depression.

Diversification an Employment Stabilizer

MORE product diversification in individual manufacturing plants as well as in industrial communities will aid in stabilizing employment. But scientific planning is needed to bring this about.

A study of the experience of individual industrial plants reveals that the highly specialized or "single-product" plants were not able to maintain their employment levels, during 1930, as well as did concerns which made a variety of products appealing to different classes of consumers. As a general rule, the latter were able to keep more men employed more hours per week than the former.

No doubt, in boom times, the specialized plant makes the greater profit and produces goods at the least cost, but seasonal profits do not compensate society for the ills of fluctuating employment.

Intelligent product selection can combine diversification with specialization to a large degree, especially when manufacturing equipment is selected and the plant layout made with an eye to flexibility. In one New England plant, for example, four distinct types of product, selling in distinct and separate consumer fields, are processed under mass-production principles using substantially the same production cycle and equipment. These products are composed of parts which have a close resemblance from the dimensional and accuracy requirement standpoint, involve substantially similar completing operations, but differ in use.

The same principle of diversification applies to industrial communities as well as to individual plants. There are a number of manufacturing centers where a single product predominates. Such communities make rapid strides when their particular industries are going well, but it is in these places that the largest amount of unemployment occurs during a depression.

Industries and industrial concerns are migrating more than they ever did before. The network of electric power transmission lines which has spread over the country has combined with the motor truck and worker's motor car to give great range and flexibility to plant location. Many concerns are studying the possible advantages of new plant sites. It would be well for chambers of commerce and others who foster new industrial developments to keep in mind the value of diversification as an employment stabilizer.

It Is Time to Saw Wood

WITH all the criticism that has been leveled against the "new era" notion of a few years ago, there is reason to fear that it is still doing harm. Was not that very notion one of the great causes of the depression? It could not have been a cause if it had not been a mistake and certainly the first duty is to get rid of mistakes. We must set our mental house in order.

Talking about "confidence" as an influence toward better times represents in no small part the spirit of that old "new era," for the confidence of that time was largely misplaced, and we have had the additional experience of a year ago, when months after the stock market collapse there was still too much confidence, as events in the remainder of the year proved.

Watching the stock market is another survival. When the market was booming people looked at it instead of at fundamental economic conditions. Many men felt at the time that they could hardly see reason for so much activity and such strong hopes, but there was the stock market, and how could it be wrong? When we know that the stock market misled people so

And, it is hardly the time to trust it again. It may not have gone down far enough to adjust itself to economic conditions already existing, in which case it will decline further. It may have gone down too far, in which case it will advance. In either case it would be no guide, no index to conditions already in existence, much less a prophecy as to what is coming.

Indeed, survival of the "new era" notion is shown by the strong disposition to compare and to measure this depression with those of the past. That is in essence a denial that new mistakes were made. The times that preceded this depression were different from the times that preceded other depressions, and the present physical and mental conditions are different from those in other depressions. On the mental side the most striking difference is the tremendous amount of talk there is about it. There was too much preaching of false doctrines during the "new era" and there is too much even now, although faith in artificial stimulants as a means of reviving business is distinctly on the wane.

In past depressions the mental attitude was that one must saw wood. Even though we face a new set of economic conditions today, that attitude is still a wholesome one, worthy of wider adoption. It is time for less talk about the future and more assiduous application to the problems of the present.

Processes Change in Tubular Goods

A PREDICTION has been made that in two years there will be no lap-weld pipe furnaces left in the United States. There are relatively few even now, many having been abandoned in recent years while others are left because the ground they occupy is not needed at present. In standard or merchant pipe, the ordinary pipe of commerce, demand is chiefly for the small sizes, made by butt-welding, and for a time at least the vogue of butt-weld will increase as industrial and building activities increase.

Our petroleum industry began 70 years ago, production in 1860 being half a million barrels and ten years later ten times as much, while year before last a billion barrels was reached. Until the last few years wells were relatively shallow and lap-weld pipe was perfectly satisfactory. Then much deep-well territory was developed, in the Southwest and in California, and rotary drilling came into vogue, requiring seamless tubes for the drilling operation, while seamless, again, was adopted for casing the wells when completed. That resulted in the first large production of seamless tubing, from a tonnage standpoint. The second is now in progress, for pipe lines.

Successive developments in seamless tubes may be traced in the story of tonnage production, there being no statistics of feet produced. Tonnage output of seamless tubing increased about 12½ per cent yearly from 1913 to 1922, partly on account of general growth of the country, but largely from seamless supplanting welded for boiler tubes. From then to 1926 the percentage increase doubled, reflecting the large use of seamless in the oil and gas industries. After 1926 drilling was greatly restricted;

yet in the three years, 1926 to 1929, production of seamless increased 19 per cent year by year, reflecting the entrance of seamless into pipe lines.

Number of wells drilled is no criterion of either tubular goods consumption or production of oil and gas, for depth of wells varies greatly and also production. In 1929 six States averaged less than two barrels daily of oil production per well: Illinois, Indiana, Kentucky, New York, Ohio and Pennsylvania, the Pennsylvania average being only four-tenths of a barrel, many wells being pumped only every week or so. At the other extreme, west Texas averaged 161.3 barrels daily per well, California 75.5 barrels and the Gulf Coast of Louisiana 60.1 barrels. Numbers of wells drilled appear below:

	Oil	Gas	Dry	Total
1925	16,559	2,330	6,734	25,623
1926	19,013	2,341	7,965	29,319
1927	14,442	2,491	7,210	24,143
1928	12,526	2,727	7,078	22,331
1929	15,572	2,870	7,914	26,356
1930	11,577	2,885	6,073	21,535

In the last annual number of THE IRON AGE a compilation of steel-producing capacity was given, based on the Iron and Steel Works Directory of 1930 plus known additions to the end of the year. The total found for pipe was 6,582,200 gross tons, in fire-weld and seamless, the directory not including electric weld. With no abandonments other than represented by omissions from the directory, but including seamless now on the way and a conservative rating for electric weld, the total capacity is fully 7,000,000 gross tons.

In 1929 production was 3,018,740 gross tons of fire-weld and 1,303,485 tons of seamless, making 4,322,225 tons, while a full allowance for electric weld would not raise the total to 5,000,000 tons. As time passes and financing of pipe lines becomes easier it is likely that the combined seamless and electric weld will greatly exceed fire-weld production.

Wheat Growing

A GRARIAN discontent, which is so loudly voiced by the radical group of Senators in Congress, emanates especially from the part of the Union where wheat is raised. In the mind of the public the impression has been created that the only farmers are those who raise wheat. In this article we are not going to be argumentative, but shall simply present some facts.

Besides wheat the principal crops of this country are corn, hay, cotton, oats, barley, potatoes, tobacco, apples and oranges. Other agricultural products are sugar, rye, flax, miscellaneous fruits and vegetables of many kinds for quick consumption and for storage, including canning. A large number of farmers are engaged in furnishing animal products. Out of the total gross produce of agriculture, aggregating about 12 billion dollars per annum, wheat amounts to about 7 per cent.

Wheat differs from some of the other agricultural products in that heretofore we have had an exportable surplus of it. That surplus comes into

competition with the wheat of Canada, Argentina and eastern Europe. This year Russia has been dumping wheat in order to create foreign credit, and that, together with other conditions, has developed a low price for this grain.

Our Farm Board, under instructions by Congress, has been trying to uphold the price for wheat by the use of funds drawn from the public treasury. So far it has not been successful.

It is thought that Russian wheat may be grown more cheaply than American. It is thought that America may cease to be an exporter of wheat. If the latter happens and the demand for our wheat is confined to the domestic user, the size of the market can be closely reckoned.

Our domestic consumption is about 270 lb., or 4.5 bushels, per capita per annum with a diminishing tendency, apparently for the reason that the people turn to other foods when they can afford them. Indeed, hygienists urge the eating of less starch. Anyway, the consumption of foodstuffs is incapable of the immeasurable increase that may occur in respect to the metals, for so long as human beings are of the present size they cannot eat more than a certain quantity of food.

Consequently, if farmers overproduce, there is bound to be a surplus on their hands and the market will be preempted by the cheaper producers. Mr. Legge has tried to make this clear, but the acreage of

new wheat planting evinces that he receives no attention. Perhaps it is preposterous to expect that planters, thousands in numbers and individualistic in character, should consider any plan of curtailment, which is more likely to be determined by the constraint of natural law.

It is not at all certain that American wheat is over-costly to produce if it be produced on a large scale by organized methods. Thomas Campbell, the great wheat grower of Montana, has long been the prophet of cheap wheat. We believe he has given some instruction to the Russians.

Some of our Kansans are now exploiting that idea. One corporation with 75,000 acres and another with 35,000 are actively farming, while many others are so contemplating. They figure that the work of two farmers living the year round on their farms can be done by one man in three months and that by the organized economy of labor wheat may be grown at a cost of 30c. to 50c. a bushel.

Already are the farmers' organizations and their legislative representatives up in arms against this movement, seeing only that the 160 and 320-acre farmers are going to be extinguished. Without arguing this one way or the other, we do see that this movement toward large-scale wheat growing introduces some new economic problems, for which the railroads, Wall Street, power trusts and other big-a-bos are blameless.

CORRESPONDENCE

Heaviest Plates Made Abroad

To the Editor: The Jan. 8 issue of THE IRON AGE refers to the Lukens Steel Co. having recently rolled not only the widest plate but the heaviest plate in the world. This statement is perhaps correct as to the width of the plate, but far from the facts as to the weight of the heaviest plate.

Having spent a year in the foreign mills, I am particularly familiar with the range of sizes and the equipment of the Continental works, and find in my memorandum book a record of some plates I have seen, two of which very much exceed the weight of the Lukens plate, namely:

87 ft. 11 in. x 11 ft. 11 in. x 1.515 in. Weight 64,900 lb.
43 ft. 2 in. x 11 ft. 1 1/4 in. x 11.8 in. Weight 233,200 lb.

The 87-ft. 11-in. plate not only exceeds the Lukens plate by 34.6 per cent in weight, but is more than 100 per cent larger in area as well, having an area of 1052 sq. ft. as compared to the Lukens plate of 488.5 sq. ft.

The heavier plate is almost equal in area to the Lukens plate and is almost five times the weight of the Lukens plate.

I might also add several plates of extreme size and very light gage:

56 ft. 1 1/4 in. x 77 1/2 in. x No. 16 R.W.G.
55 ft. 9 1/2 in. x 91 in. x No. 10 R.W.G.
98 ft. 10 in. x 59 1/2 in. x 1/8 in.
39 ft. 6 in. x 72 1/2 in. x No. 10 R.W.G.
48 ft. 4 1/2 in. x 72 1/2 in. x No. 25 R.W.G.

It is doubtful if these plates can be duplicated on American mills.

Another rather extreme plate I have made note of was of the following size:

12 ft. 7 in. dia. x 9.196 in. weighing 1123 lb.

This is quite remarkable for the extreme width and the light gage, with only a small "crown."

All of these plates were rolled a number of years ago and can no doubt be exceeded both as to weight and size in some of the newer plate mills.

The odd sizes and gages are due to my having changed them from metric to English measure.

ROBERT H. IRONS

President, Central Iron & Steel Co.

Harrisburg, Pa.

Pitting in Water Turbines

IT has been found that the frequently sudden and severe pitting which appears in water turbines, as well as in propellers, is the consequence of cavitation, says E. Englesson in an article entitled "Pitting in Water Turbines," in *Engineer*, London, Oct. 17, 1930, pages 418 to 421.

The factors which cause drop of pressure and consequently cavitation are enumerated. A material which is homogeneous and has great resistance to wear, together with a high corrosion-fatigue limit, should also be highly resistant to pitting. The corrosion-fatigue limit is the most decisive factor of quality in judging the pitting resistance of materials. Of the materials investigated, stainless steel and iron, owing to their high corrosion-fatigue limit, showed the greatest resistance to erosion.

Pig Iron Production Increases 3 Per Cent in January

▲ ▲ ▲
GAIN in Steel-Making Iron
Is 12 Per Cent—Ingot
Output Shows Further Im-
provement — Scrap Grows
Weaker Except at Detroit.
▼ ▼ ▼

JANUARY brought the first gain in pig iron production since April, 1930. Output was 1,714,266 tons, or 55,299 tons a day, compared with 1,665,690 tons, or 53,732 tons daily, in December, an increase of 3 per cent. All of the expansion was in the production of steel-making iron, which rose 12 per cent. Merchant pig iron output suffered a further sharp decline, dropping to 9416 tons daily in January from an average of 12,780 tons in the previous month.

Blast furnaces operating on Feb. 1 numbered 102 as against 95 on Jan. 1, the first gain in active capacity since March of last year. While the output for the month is noteworthy for bringing a protracted decline to a halt, it is the smallest for any January since 1922.

STEEL demand has lost momentum and is increasingly uneven, with some market centers reporting that improvement has been definitely arrested. But specifications in the aggregate continue to show slight expansion, with tin plate, rails, track accessories and line pipe giving production the best support. Tin mill operations have risen to 65 per cent of capacity, with further gains in prospect. Rail mills continue at a 50 per cent rate at Chicago and are expected to speed up somewhat by the middle of the month.

Raw steel output, which reflects the composite requirements of all finishing mills, has increased at Buffalo, Chicago and Birmingham and is at least holding its own in other producing districts. Ingot production for the country at large now averages fully 48 per cent, compared with 47 per cent a week ago.

FINISHED steel and pig iron prices are generally unchanged in the face of light buying. Contract users are covered for the quarter and most current orders are too small to give prevailing quotations a severe test.

Scrap is weak in most market centers, with further reductions reported on numerous miscellaneous grades, particularly in the West. Open weather in the Chicago and St. Louis districts has brought out offerings of yard stocks, which are normally frozen and buried under snow at this season. Excessive accumulations pressed for sale by dealers who miscalculated the post-inventory recovery in demand are also a disturbing factor.

Heavy melting grade is unchanged in price except

at Cleveland, where it is off 50c, a ton, and at Detroit, where it has advanced an equal amount. The Detroit old material market, incidentally, stands out as an exception to the general trend, heavy specifications by a local steel mill having given prices a stronger tone.

AUTOMOTIVE demand for finished steel is not expected to show much of a gain this month. Yet estimates of motor car output are steadily being revised upward, indicating that performance is exceeding the hopes of an industry in which extreme conservatism now rules. January production of motor vehicles in this country and Canada is now placed at between 175,000 and 200,000 units, with a fair chance that official figures may reach the latter total. February car assemblies, it is now thought, may range from 225,000 to 250,000.

Line pipe backlogs have been swelled by an order for a 275-mile project extending from El Paso, Tex., into Mexico, calling for 30,000 tons of steel. The Milwaukee fabricating plant, which has the contract, is now taking shipments of steel for the first 70 miles of the line. Other pipe lines, requiring a total of 100,000 tons of steel, are likely to be let within the next month or two.

Rail contracts include 27,400 tons placed by the Nickel Plate and 15,000 tons by the Grand Trunk. The Pennsylvania has distributed orders for track accessories, of which 4000 tons went to Chicago mills.

STRUCTURAL steel awards, while not yet reflecting to any large degree the construction activities of Federal, State and municipal governments, totaled 35,000 tons, against 7500 tons in the week before. The average of bookings in the past five weeks is 31,100 tons. Outstanding lettings were 12,000 tons for a bank building in Philadelphia and 4000 tons for a Ford assembly plant in Seattle. New projects of 37,000 tons include 13,000 tons for a tunnel at East Boston.

Vessels to be built for the Eastern Steamship Lines, Inc., call for a total of 12,000 tons of plates, soon to be purchased. Three Lake barges, contracted for by the Ford Motor Co., will require 4500 tons of steel.

A leading maker of wire products announces that, effective at once, the merchant trade will be asked the same prices on bright wire, annealed wire and galvanized wire as manufacturing consumers.

PITTSBURGH

Steel Production Rate Maintained But Has Made No Further Gain

PITTSBURGH, Feb. 3.—Shipments of steel products from Pittsburgh district mills during January were 15 to 20 per cent ahead of those of December, but failed to bring about a corresponding improvement in operating schedules. With outgoing tonnage at a very low rate in the last two weeks of December, many orders placed during that time were not acted upon until the turn of the year, and in some cases material which accumulated at mills was not shipped out for several days. As a result, the beginning of another month finds local steel producers more dependent than they were 30 days ago upon current releases, and any falling off in specifications at this time would probably be followed by entanglement in operating schedules.

While some curtailment by finishing mills is reported, the general production rate in this and nearby districts has not changed materially, even though improvement has been rather definitely checked. Steel ingot production for the current week is estimated at 45 per cent of capacity, where it has stood since about Jan. 15. The largest producers, with a diversified line of products, are running at the above figure and have made no appreciable changes in blast furnace or open-hearth capacity for several weeks. One or two independent companies are running more than half their open-hearth capacity, while others are occupied at less than 40 per cent.

Tin mill schedules continue to show the most steady gains in this territory. Production this week for that branch of the industry is estimated at 65 per cent, with three or four companies scheduled at capacity. This gain has been largely offset by interrupted schedules at sheet and strip mills, which scarcely average 40 per cent of capacity, and are still forced to operate on a day-to-day basis in many cases. Rail production is well maintained, and output of truck accessories is picking up slightly. Structural and plate mills are maintaining recent activity, while bar production is barely holding its own.

Releases from the principal consuming industries show little change, and definite indications of immediate improvement in requirements are lacking. Pittsburgh district mills are deriving little benefit from improved schedules by agricultural implement makers in the West, and releases from the automobile industry fail to show any marked change. While reports from some motor car builders indicate heavier output during Feb-

General production rate in steel industry has not changed materially.

* * *

Shipments of finished steel products in January gained 15 to 20 per cent over those of December.

* * *

Tin mill schedules showing the greatest increase, now averaging 65 per cent, with some companies at capacity.

* * *

Releases from principal consuming industries for various steel products show little change.

* * *

Prices fairly firm in the face of very light buying.

market for basic iron apparently exists at this time, with all the principal consumers well covered for some time. One of the largest buyers of foundry iron in the district is also said to have sufficient iron bought to supply its needs until July 1.

Prices per gross ton, f.o.b. Valley furnace

Basic	\$17.50
Bessemer	17.50
Gray forge	16.50
No. 2 foundry	17.00
No. 3 foundry	16.00
Malleable	17.50
Low phosph., copper free	\$26.00 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76

Prices per gross ton, f.o.b. Pittsburgh district furnace

Basic	\$17.50
No. 2 foundry	17.00
No. 3 foundry	16.00
Malleable	17.50
Bessemer	17.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Semi-Finished Steel

While shipments during January exceeded those of December by a comfortable margin, little increase was reported in the latter half of the month. New buying of billets, slabs and sheet bars is negligible, although contracts are occasionally quietly extended over a longer period on a price basis of \$30, Pittsburgh. Forging billets continue at \$36, with small sales reported at this figure from time to time, and little tonnage buying coming out to test the market. Wire rods are quiet and slightly lower operations by some bolt and nut makers are reflected in lighter shipments. The price is unchanged at \$35, Pittsburgh.

Rails and Track Accessories

Most of the larger railroads have now completed the placing of both rail and accessory contracts for the present year. The New York Central and the Erie closed against their requirements last week, while the awards of the Pennsylvania have been tentatively allocated. The Nickel Plate is still in the market for fastenings, as is the Maine Central. The requirements of the Bangor & Aroostook have been placed. Specifications show a moderate increase, although rail tonnage is slow in coming out. Prices are maintained on both rails and accessories.

Bolts, Nuts and Rivets

Specifications coming to some companies have been slightly lower in the last week or two, and operations barely average 35 per cent of capacity. Prices are holding at recent levels.

ruary, curtailed demand has come from others, and it does not now appear that the month will bring much change in the amount of steel shipments to the Michigan area.

In a few cases, makers of steel building products are specifying more freely, and demand from electric refrigerator manufacturers and makers of steel furniture and office equipment is expanding slightly. Warehouse buying continues very light, and the oil industry offers little encouragement.

Prices continue unchanged in the face of very light buying. Contract users are generally covered, and small buyers, who place their needs on a hand-to-mouth basis, are not taking enough steel to warrant pressure for price concessions. It is indicated by some companies that purchasing policies will be somewhat changed this year, and that the pressure for price concessions which continued during 1930 may be lifted to some extent.

The raw material markets are very quiet, with pig iron buying confined to carload lots, and scrap purchases entirely lacking in the last week.

Pig Iron

Sales are confined to small lots for immediate shipment, most of which are being made on the basis of \$17.50, Valley, for foundry iron, and \$17.50 for malleable and Bessemer. The local furnace quotes prices 50c. a ton higher. No sizable inquiries are reported, and shipments against contracts have shown little change. No

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Net Gross Ton	Feb. 7, 1931	Jan. 27, 1931	Jan. 6, 1931	Feb. 7, 1930
No. 2, Phila. furnace	\$17.76	\$17.76	\$17.76	\$20.76
No. 2, Valley furnace	17.00	17.00	17.00	18.50
No. 2, Southern, Ch'l.	14.19	14.19	14.19	17.69
No. 2, Birmingham	13.09	13.09	14.00	14.50
No. 2 foundry, Chicago*	17.50	17.50	17.50	20.00
Basic, old eastern Pa.	17.25	17.25	17.75	19.50
Basic, Valley furnace	17.09	17.09	17.00	18.50
Valley Bessemer, old Pa.	19.26	19.26	19.26	20.76
Malleable, Chicago*	17.50	17.50	17.50	20.00
Malleable, Valley	17.50	17.50	17.50	19.00
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	80.00	80.00	80.00	100.00
Rails, Billets, Etc., Per Gross Ton				
Rails, heavy, at mill	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Re-rolling billets, Pittsburgh	30.00	30.00	30.00	32.00
Sheet bars, Pittsburgh	30.00	30.00	30.00	32.00
Slabs, Pittsburgh	30.00	30.00	30.00	32.00
Pressing billets, Pittsburgh	36.00	36.00	36.00	38.00
Wire rods, Pittsburgh	35.00	35.00	35.00	36.00
Sheep, gvd. steel, Pgh, R.	1.60	1.60	1.60	1.50
Finished Steel				
Per Lb. to Large Buyers	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.65	1.65	1.69	1.85
Bars, Chicago	1.75	1.75	1.79	1.95
Bars, Cleveland	1.79	1.79	1.85	1.95
Bars, New York	1.98	1.98	1.99	2.19
Tank plates, Pittsburgh	1.65	1.65	1.69	1.80
Tank plates, Chicago	1.75	1.75	1.79	1.95
Tank plates, New York	1.93	1.93	1.98	2.07 1/2
Structural shapes, Pittsburgh	1.65	1.65	1.69	1.80
Structural shapes, Chicago	1.75	1.75	1.79	1.95
Structural shapes, New York	1.90 1/2	1.90 1/2	1.95 1/2	2.04 1/2
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.55	1.55	1.55	1.80
Cold-rolled strips, Pittsburgh	2.25	2.25	2.25	2.85
Old Material, Per Gross Ton				
Heavy melting steel, Pgh.	\$13.00	\$12.00	\$12.25	\$16.75
Heavy melting steel, Phila.	10.50	10.50	10.50	14.50
Heavy melting steel, Chicago	10.12 1/2	10.12 1/2	10.25	12.00
Crucibles, Chicago	10.50	10.75	11.25	14.25
Crucibles, Philadelphia	12.50	12.50	14.00	15.00
No. 1 cast, Pittsburgh	12.50	12.50	12.50	15.00
No. 1 cast, Philadelphia	15.00	12.00	12.00	15.00
No. 1 cast, Chicago (net ton)	9.50	9.50	9.50	12.50
No. 1 R.R. wrot., Phila.	15.00	12.00	12.50	15.00
No. 1 R.R. wrot., Chicago (net)	8.00	8.00	8.50	12.00
Coke, Connellsville				
Per Net Ton at Oven				
Furnace coke, prompt	\$7.50	\$7.50	\$7.50	\$7.50
Foundry coke, prompt	5.50	5.50	5.50	5.50
Metals				
Per Lb. to Large Buyers	Cents	Cents	Cents	Cents
Lead, corner, New York	9.87 1/2	10.12 1/2	10.62 1/2	18.12 1/2
Electrolytic copper, refinery	9.50	9.75	10.25	17.75
Tin (strait), New York	35.35	26.00	26.62 1/2	39.12 1/2
Zinc, East St. Louis	4.10	4.00	4.10	5.25
Zinc, New York	4.45	4.35	4.45	5.60
Lead, St. Louis	4.40	4.55	4.80	6.10
Lead, New York	4.60	4.75	5.00	6.25
Antimony (Ashtab), N. Y.	7.12 1/2	7.25	7.30	8.75

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Somewhat heavier releases from the automobile industry have contributed most of the improvement this year.

Bars, Plates and Shapes

Pending Government activity is still the feature of this market, with private work slow in developing. The United States Engineers, at a number of river cities, are taking bids on miscellaneous barges, which amount to a fair aggregate tonnage. In structural bookings, Government work also figures large, and demand from private sources is still principally conjectural. The Post Office at Pittsburgh is still being held up, although plans are going forward. A fair tonnage will also be required for the Mellon Institute of Industrial Research at Pittsburgh. In reinforcing bars, future tonnage is assured by many projects, most of which will not be let before spring. Demand for bars from the automobile industry is improving slowly, but shipments this month may exceed January by a small margin. Prices are being maintained on small lots, which constitute the bulk of current buying.

Cold-Finished Steel Bars

Shipments during the past month showed a large increase over those of December, but were not in sufficient volume to support an operating rate of more than 40 per cent of capacity. In some cases gains by individual companies amounted to as much as 50 per cent. Specifications are not increasing as fast as they were a short time ago, but no general falling off is reported, and the tendency is still toward improvement. Farm implement makers are contributing heavily to recent increases, but are not yet taking steel at a rate which could be considered normal at this time of the year. The price is well maintained at 2.10c., Pittsburgh.

Tubular Goods

Pipe shipments last month were generally higher than in December, but, with the exception of two or three large line pipe orders, contributions to mill backlogs amounted to very little. Butt-weld pipe is very dull, with active capacity less than one-third engaged. Lap-weld units are even less well occupied, and opera-

tions by makers of seamless and electric welded material are spotty. Prospective line pipe tonnage is one of the favorable aspects of the market, and various projects are reaching a bidding stage. Oil country demand is very dull, and prospects for the year as a whole are clouded. Talk of discouraging the proration idea in many fields is expected to bring some action and might lead to a sudden improvement in demand for drilling pipe which could hardly be expected to be more than momentary. Mechanical tubing is improving in a limited way, and demand for boiler tubes is fair.

Wire Products

January business failed to bring out any significant improvement in demand for wire products in general, although individual lines showed occasional life. Generally speaking, companies most interested in the manufacturing trade fared the best, although small orders from jobbers came to a fair aggregate. Demand for fencing and other products going to the farming areas was exceedingly

THE IRON AGE COMPOSITE PRICES

Finished Steel		Pig Iron	Steel Scrap
Feb. 5, 1931	2.142c. a Lb.	\$15.90 a Gross Ton	\$11.21 a Gross Ton
One week ago	2.142c.	15.90	11.21
One month ago	2.121c.	15.90	11.33
One year ago	2.395c.	18.17	14.50
Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.		Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	
Based on heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.			
HighLow		HighLow	
1930.....	2.362c., Jan. 7: 2.121c., Dec. 9	\$18.21, Jan. 7: \$15.90, Dec. 16	\$15.00, Feb. 18: \$11.25, Dec. 9
1929.....	2.412c., April 2: 2.362c., Oct. 29	18.71, May 14: 18.21, Dec. 17	17.58, Jan. 29: 14.08, Dec. 9
1928.....	2.391c., Dec. 11: 2.314c., Jan. 3	18.59, Nov. 27: 17.04, July 24	16.50, Dec. 31: 13.08, July 24
1927.....	2.453c., Jan. 4: 2.293c., Oct. 25	19.71, Jan. 4: 17.54, Nov. 1	15.25, Jan. 11: 13.08, Nov. 22
1926.....	2.453c., Jan. 5: 2.403c., May 18	21.54, Jan. 5: 19.46, July 13	17.25, Jan. 5: 14.00, June 1
1925.....	2.560c., Jan. 6: 2.336c., Aug. 18	22.50, Jan. 13: 18.96, July 7	20.83, Jan. 13: 15.08, May 1

unsatisfactory. Prices on wire and nails are well maintained, with nails quoted at \$1.30 and \$2 a keg, and manufacturers' wire at 2.20c., Pittsburgh.

Sheets

The sheet business continues dull, but new bookings during January exceeded specifications by as much as 25 per cent with some companies, and the month probably added to mill backlogs. Operations continued low, averaging from 40 to 45 per cent during the month, and, with shipments somewhat heavier, the new month finds the sheet industry in a better position to reflect improvement than was the case at the year end. Among the consuming industries, the building trades probably offer the best prospect for early spring activity. However, makers of electric refrigerators are stepping up production, and demand from the steel furniture industry is improving. Automobile manufacturers are not expected to use any more steel in February, a shorter month, than they did in January, although the daily rate of consumption might improve slightly. Pittsburgh mills are not yet feeling much benefit from improved schedules among farm implement makers, and railroad car building is not of the type which requires many sheets. Prices are unchanged and are well maintained on most lines.

Tin Plate

Production this week has registered another increase, and now averages about 65 per cent of capacity for the industry as a whole. At least four independent companies in the Pittsburgh and Valley areas are maintaining capacity schedules, while the leading interest is running at 55 to 60 per cent. A gradual increase in specifications during the month is expected, and further operating gains may be registered.

Strip Steel

The strip market is still rather dull, and releases in immediate prospect are not encouraging. Operations are generally irregular on both hot and cold-rolled material, with the industry averaging about 35 per cent of

capacity. Not much improvement in demand from the automobile industry is expected during February, although January schedules will certainly be equalled. Makers of builders' products taking strip are slightly more active, and makers of office equipment are running slightly better. Prices are well maintained at 2.25c. for cold-rolled material, and 1.55c. and 1.65c. on hot-rolled.

Coal and Coke

The foundry industry is again curtailing its coke requirements, and shipments in the last week have not maintained the improvement registered earlier in the month. Furnace coke is also very dull, and price concessions are reported at various points. Some sellers are still trying to maintain the \$2.50, Connellsville, quotation, but comparatively small tonnages have sold at \$2.40 and \$2.45. Demand for domestic coke is holding

up and coal is unchanged. Production is being sharply curtailed by the larger companies, and industrial and railroad consumption has not increased appreciably.

Old Material

No important consumer purchases of scrap have been reported in the last week, and prices on the principal grades are unchanged. Closing of the Pennsylvania Railroad list on Feb. 1 will clarify prices considerably, and it is generally believed that the No. 1 heavy melting steel to be sold will bring at least \$13. Hydraulic compressed sheets are strong at \$12.50 to \$13, and the higher figure is said to have been paid recently by a dealer to cover an old order. Sales of specialties have been made to one consumer without changing the quotable range on these grades.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel...	\$12.50 to \$13.50
No. 2 heavy melting steel...	11.00 to 11.50
Scrap rails...	12.50 to 13.00
Compressed sheet steel...	12.50 to 13.00
Bundled sheets, sides and ends...	10.50 to 11.00
Cast iron car wheels...	14.00 to 14.50
Sheet bar crops, ordinary...	14.00 to 14.50
Heavy breakable cast...	10.50 to 11.00
No. 2 railroad wrought...	12.50 to 13.00
Hyv. steel axle turnings...	10.50 to 11.00
Machine shop turnings...	6.00 to 6.50
Acid Open-Hearth Grades:	
Rail, knuckles and couplers...	16.00 to 16.50
Rail, coil and leaf springs...	16.00 to 16.50
Roller steel wheels...	16.00 to 16.50
Low phos. billet and bloom ends...	18.00 to 18.50
Low phos. mill plates...	16.00 to 16.50
Low phos. light grades...	16.00 to 16.50
Low phos. sheet bar crops...	16.50 to 17.00
Heavy steel axle turnings...	10.50 to 11.00
Electric Furnace Grades:	
Low phos. punchings...	15.00 to 15.50
Heavy steel axle turnings...	10.50 to 11.00
Blast Furnace Grades:	
Short shoveling steel turnings...	7.50 to 8.00
Short mixed borings and turnings...	7.50 to 8.00
Cast iron borings...	7.50 to 8.00
Rolling Mill Grades:	
Steel car axles...	18.00 to 18.50
Cupola Grades:	
No. 1 cast...	12.00 to 12.50
Rails 3 ft. and under...	14.00 to 14.50

Warehouse Prices, f.o.b., Pittsburgh

*Base per Lb.	
Plates...	2.85c.
Structural shapes...	2.85c.
Soft steel bars and small shapes...	2.75c.
Reinforcing steel bars...	2.75c.
Cold finished and screw stock—	
Rounds and hexagons...	3.25c.
Squares and flats...	3.85c.
Rounds...	3.10c.
Hoops...	4.10c.
Black sheets (No. 24), 25 or more bundles...	3.25c.
Galv. sheets (No. 24), 25 or more bundles...	3.85c.
Light plates, blue annealed (No. 10), 1 to 24 plates...	2.75c.
Blue annealed sheets (No. 12)...	2.65c.
Galv. corrug. sheets (No. 28), per square...	4.25c.
Sinks, large...	2.65c.
Small...	2.90c. to 3.05c.
Boat...	3.15c.
Track bolts, all sizes, per 100 count, 60 and 10 per cent off list	
Machine bolts, 100 count, 60 and 10 per cent off list	
Carriage bolts, 100 count, 60 and 10 per cent off list	
Nuts, all styles, 100 count, 60 and 10 per cent off list	
Large rivets, base per 100 lb....	\$3.30
Wire, black, soft annealed, base per 100 lb....	2.40
Wire, galv. soft, base per 100 lb....	2.85
Common wire nails, per keg...	2.15
Cement coated nails, per keg...	2.15

*On plates, structurals, bars, reinforcing bars, rounds, hoops and blue annealed sheets, base applies to orders of 400 to 999 lb.

Duriron Co., Dayton, Ohio, has opened a sales office in the General Motors Building, Detroit. Richard R. Rourke, former sales engineer out of the general office, is manager.

CHICAGO

Steel Buying and Mill Operations Continue to Make Slow Gains

CHICAGO, Feb. 3.—The opening days of February find the steel market making slow but steady progress. Sales of finished steel products are heavier and specifications are the largest since the first of the year. The matter of releases is important, as growth has been steady during the past 10 to 12 days. Ingot output is estimated at 45 per cent of capacity, some units being slightly above this figure, while others have not quite reached it. However, production has definitely reached the stage where it is closely measured by consumption, which was not the case in early January, when depleted stocks had an important bearing on specifications.

The Wisconsin Steel Co. last week lighted a blast furnace, thereby making use of two of three units at that plant. This was the second steel mill furnace to be brought into use in January, bringing the count of active stacks to 14 of 36 in this district.

The position of plate mills is being strengthened by resumption of pipe manufacture on a larger scale. Structural business, considering the full territory contributory to local mills, is following an upward path. Recent releases against rail contracts are for 5000 tons, and it is not at all unlikely that rolling schedules will have to be advanced by the third week in February.

Sellers are taking a firmer stand on prices as evidenced by the announcement that, effective at once, the merchant trade will be asked the same prices that are being quoted on bright wire, annealed wire and galvanized wire to the manufacturing trade. Spring demand is more in evidence in the wire market, and production schedules are being raised several points. Sheet output has gained 5 to 10 points to a range from 50 to 55 per cent of capacity.

Pig Iron

Shipments of Northern foundry iron in January were fully 15 per cent heavier than in November and 50 per cent larger than in December. Specifications are making a good showing, and there is reason for the trade to believe that February will give a good account of itself. A few of the larger consumers are taking heavier tonnages, indicating that pig iron carried over in stock piles has been diminished and that there is need for replenishment. The greatest activity in this district seems to center in the automobile trade, especially in western Michigan. Local gray iron foundries find business still quiet and spotty. Southern iron is now being priced to most buyers at

Sales and specifications in finished steel market reflect continued, though slow, expansion. * * *

Ingot output at 45 per cent, compared with 42 per cent recently. * * *

Sheet production gains 5 to 10 points to 50 to 55 per cent of capacity. * * *

Pig iron shipments in January 50 per cent heavier than in December and 15 per cent above November's. * * *

Scrap market weak, with lower prices on many items.

\$10.50 a ton, Birmingham. The charcoal iron market is steady at \$24 a ton, furnace. Four stacks are in blast. The Superior Charcoal Iron Co., Grand Rapids, Mich., reports that its sales of Lake Superior charcoal iron in January exceeded those of any previous month in two years, excepting February and March, 1930.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	\$17.50
N'th'n No. 3 fdy., sil. 2.25 to 2.75	18.00
Malleable, not over 2.25 sil.	17.50
High phosphorus	17.50
Lake Super. charcoal, sil. 1.50	27.00
S'th'n No. 2 fdy., sil. 1.75 to 2.25	17.50
Low phos., sil. 1 to 2 cop-per free	\$28.50 to 29.20
Silvery, sil. 8 per cent	26.79
Bess. ferro-silicon, 14-15 per cent	35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys

There are still a few contracts to be closed in this market. Shipments are light and spotty.

Rails and Track Supplies

The Nickel Plate has ordered 27,400 tons of rails from Eastern and Western mills. About 15,000 tons of the 30,000 tons of rails reported purchased a week ago were placed by the Grand Trunk. The unwillingness of railroads to release rails against new contracts is as discouraging as their slowness in making commitments for 1931. Shipping instructions have been coming in slowly, barely supporting output at 50 per cent of capacity. However, in recent days releases have been a little larger but producers do not expect heavier rollings until after mid-February. Western mills have taken 4000 tons of track accessories

for the Pennsylvania and 5000 tons for the Pere Marquette. Releases this week total 5000 tons.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c; track bolts with square nuts, 2.80c; steel tie plates, 1.95c; angle bars, 2.15c.

Cast Iron Pipe

Columbus, Ohio, has placed 2100 tons of 30-in. pipe with James B. Clow & Sons, Cincinnati has awarded 200,000 ft. of 4 to 12-in. pipe to an unnamed bidder. St. Louis is in the market for 26,000 ft. of 6-in. and 8000 ft. of 8-in. pipe. Detroit will purchase 53,000 ft. of 6-in. and 79,000 ft. of 8-in. pipe. S. A. Healy, Detroit, is low bidder on the work for the Sanitary District at Chicago. This project involves about 1800 tons of pipe. Milwaukee has placed 300 tons of special castings with a foundry there.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$44 to \$46; 4-in., \$47 to \$49; Class A and gas pipe, \$5 extra.

Sheets

Demand for the products of hot mills has grown materially in recent days and operations have been stepped up about 10 points to a range of 50 to 55 per cent of capacity. Gutter and down spout manufacturers are specifying more heavily and container makers are finding business more brisk. Not many users have contracts with mills, most consumers preferring to order sheets as they find need for them. Distribution by warehouses continues to grow slowly. Prices of sheets are steady.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.50c. to 2.60c.; No. 24 galv., 3.05c. to 3.15c.; No. 10 blue ann'd, 2.05c. to 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Bars

Specifications for mild steel bars and alloy steel bars are the heaviest so far this year, and inquiries are promising. Road machinery manufacturers are speeding production and are building stocks of machinery for delivery in the early spring. Manufacturers of tillage machinery report heavier output, and spring makers have larger orders. Demand for rail steel bars has finally started to grow and output is being advanced slowly. The Calumet Steel Co. will resume operations this week after a shut-down for extensive repairs. The movement of fence post is gaining momentum.

Bolts, Nuts and Rivets

Shipments of these commodities in January made a substantially better showing than in December, and as

February gets under way the outlook is favorable for further growth. Road machinery builders are taking a strong lead in pressing output. There is a noticeable gain in production of tillage machinery, and tractor building stands as an important item in mid-Western activity. Automobile plants tributary to the Chicago market, though not gaining in production, are holding to steady schedules.

Coke

January shipments of by-product foundry coke gained slowly but steadily as January advanced, and releases now at hand promise more extensive use in February. The price is steady at \$8 a ton, local ovens.

Reinforcing Bars

January, though better than December in contracts, was a disappointing month. Week after week the hopes of reinforcing bar sellers have been sustained by a substantial volume of estimating, but the mortality among projects has been unusually high. Public work, though still considered promising, is slow in developing. For instance, bids have been rejected three times on some Chicago schools, and now the Stickney sanitary job has struck a snag in the letting of the general contract. Additional road lettings have been made but contractors are slow in buying the necessary reinforcing bars. Probably not less than 2500 tons will be ordered for paving contracts that have been awarded by the State of Illinois and various counties in the State.

Plates

Shipments of skelp from Chicago mills to Milwaukee are increasing, as pipe manufacture at that point increases. The A. O. Smith Corp. has taken from the Engineers' Public Service Co. an order for a pipe line that will extend from El Paso, Tex., into Mexico. This line will be 275 miles long and will require 30,000 tons of pipe. The first order involves 70 miles of the line. In addition to this favorable turn in events, Western mills have received upward of 2000 tons of releases by various tank builders and also some shipping orders for bridge work recently awarded. There are few active inquiries for tankage, but it is reported that the outlook in this field is promising. If Western railroads have plans for new cars they are keeping the subject very quiet. The only order of note is for 14 gas-electric cars placed by the Santa Fe. Taken as a whole, the Western plate market is gaining strength, but it still lacks the support of railroad business.

Wire Products

A leading producer of wire and wire products is announcing, effective at once, that prices for bright annealed and galvanized wire to the merchant trade will hereafter be the same as those named to the manufacturing trade. That is, there will be only one price for each product and

all buyers will be on the same basis. Quotations will be 2.20c. a lb., Pittsburgh, for bright wire; 2.35c. for annealed wire and 2.80c. for the galvanized product. Demand for wire and wire products is slowly gaining headway and output has been advanced slightly to a range of 40 to 45 per cent of capacity. Some contractors have started to place orders for concrete mesh, and concrete pipe makers in the South are beginning to take tonnages. Paving programs are large, and there is every reason to believe that the movement of mesh will be heavy throughout the spring months. The copper cable market is quiet in sales, but specifications are larger. The jobbing trade remains spotty and, on the whole, not larger than in the closing days of January.

Structural Material

Among the most important projects that will come out for figures in the next few days is the development program of Inland Steel Co. This involves a new strip and continuous sheet mill, for which 10,000 to 12,000 tons of structural steel will be used. It is also likely that the South approach and the bascule bridge for the Outer Drive, Chicago, will be out for figures early this month. Interesting from the viewpoint of steel mill expansion in this district is the announcement that Wisconsin Steel Co. is planning two new mill buildings. Highway bridge work continues to be a feature of the market as States as far west as New Mexico and Montana place tonnages.

Old Material

Continued pressure to move a volume of scrap that exceeds consumption and the unwillingness of consumers to build larger stock piles have definitely turned the local scrap iron and steel market to the weak side. The most recent sale of heavy melting steel was at \$10.25 a gross ton, delivered, and offers at this figure are unattractive, largely because mill stocks are of ample size, considering current

ingot output and also because some dealers have seen fit to consign tons to mills at a faster rate than they can be handled. It is said that about 100 cars are waiting to be unloaded at one mill. This situation is being resisted by users, who have tightened on inspections, with resultant heavy rejections.

Weather in the Middle West remains open, and therefore is favorable for gathering, preparing and moving scrap. Some yard operators now wish to turn their stocks, which normally at this time of year would be frozen and buried under snow. Within a very short time after railroad scrap is sold, shipments come out on track. Practically all market factors are contributing to the congestion of distress tonnage. Use of scrap by foundries remains small and spotty. The smaller units hesitate to order beyond nearby requirements and therefore specialties seldom move in more than single carloads. Taken as a whole, the market seems to be more affected by the disappointment in the scrap trade than by the general business situation.

Prices delivered Chicago district consumers.

Per Gross Ton	
Basic Open-Hearth Grades:	
Heavy melting steel.....	\$19.00 to \$19.25
Shoveling steel.....	19.00 to 19.25
Props, switches and guards, cut apart, and misc. rails.....	10.50 to 11.00
Factory hyd. comp. sheets.....	8.50 to 9.00
Drop forge flashings.....	7.50 to 8.00
No. 1 busheling.....	7.25 to 7.75
For'd east and r'd steel carwheels.....	13.00 to 13.50
Railroad tires, charg. box size.....	13.00 to 13.50
Railroad leaf springs cut apart.....	13.00 to 13.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles.....	12.00 to 12.50
Coil springs.....	13.25 to 13.75
Electric Furnace Grades:	
Axle turnings.....	11.00 to 11.50
Low phos. punchings.....	11.50 to 12.00
Low phos. plates, 12 in. and under.....	11.50 to 12.00
Blast Furnace Grades:	
Axle turnings.....	8.50 to 9.00
Cast iron borings.....	4.75 to 5.00
Short shoveling turnings.....	4.50 to 5.00
Machine shop turnings.....	4.25 to 4.75
Rolling Mill Grades:	
Iron rails.....	11.00 to 11.50
Re-rolling rails.....	12.00 to 12.50
Cupola Grades:	
Steel rails, less than 3 ft.....	12.00 to 12.50
Steel rails, less than 2 ft.....	12.50 to 13.00
Angle bars, steel.....	11.50 to 12.00
Cast iron carwheels.....	10.50 to 11.00
Malleable Grades:	
Railroad.....	12.25 to 12.75
Agricultural.....	11.25 to 11.75
Miscellaneous:	
*Relaying rails, 56 to 60 lb. and heavier.....	23.00 to 23.50
*Relaying rails, 65 lb. and heavier.....	26.00 to 26.50
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars.....	10.50 to 11.00
Iron arch bars, and transoms.....	11.00 to 11.50
Iron car axles.....	19.00 to 20.00
Steel car axles.....	13.00 to 13.50
No. 1 railroad wrought.....	8.00 to 8.50
No. 2 railroad wrought.....	8.50 to 9.00
No. 1 busheling.....	6.00 to 6.50
No. 2 busheling.....	4.00 to 4.50
Locomotive tires, smooth.....	12.50 to 13.00
Pipes and flues.....	5.50 to 6.00
Cupola Grades:	
No. 1 machinery cast.....	9.50 to 10.00
No. 1 railroad cast.....	9.00 to 9.50
No. 1 agricultural cast.....	8.50 to 9.00
Stove plate.....	7.75 to 8.25
Grate bars.....	7.50 to 8.00
Brake shoes.....	7.75 to 8.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

Base per Lb.	
Plates and structural shapes.....	2.00c.
Soft steel bars.....	2.00c.
Reinforcing bars, billet steel.....	2.00c.
Rail steel reinforcement.....	1.50c. to 1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	2.85c.
Plats and squares.....	2.85c.
Rounds 3 in. (to Nos. 10 and 12 gages).....	3.10c.
Hoops (No. 14 gage and lighter).....	2.65c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.25c.
Blue ann'd sheets (No. 10).....	3.25c.
Spikes (3/4 in. and larger).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
Per Cent Off List	
Machine bolts.....	60 and 10
Carriage bolts.....	60 and 10
Cone and lag screws.....	60 and 10
Hot-pressed nuts, sq. tap, or blank.....	60 and 10
Hot-pressed nuts, hex., tap, or blank.....	60 and 10
No. 8 black ann'd wire, per 100 lb.....	\$2.45
Com. wire nails, base per keg.....	2.30
Cement c'd nails, base per keg.....	2.30

CLEVELAND

Halt Occurs in Uptrend of Steel Orders

CLEVELAND, Feb. 3.—The uptrend in the demand for finished steel seems to have halted. Specifications the past week were in about the same volume as during the previous week. Orders are fairly numerous, but for small lots. Cleveland steel plants are operating at 50 per cent of ingot capacity, the same as during the previous week. Demand from the automotive industry this month is not expected to show much change from January. Aside from Ford and Chevrolet, only two or three motor car companies are operating well.

The first activity in Lake shipbuilding in some time is the award of three barges by the Ford Motor Co. to the Great Lakes Engineering Works. These will require 4500 tons of steel. The boats will be 300 ft. long, of the canal type, and it is understood that they will be used for transporting automobile parts from the Ford plant to New York by Lake Erie and the Barge Canal.

Important work in improving the Lake waterways will be started shortly by the Federal Government. This will be accomplished by increasing the depth of water to 26 ft. in the Lake channels and ports and will provide an impetus toward the rebuilding of Lake docks and the installations of new mechanical-handling facilities and perhaps a stimulus for building new Lake boats, as deeper channels will allow the operation of larger boats than at present. For this work, \$26,000,000 has been appropriated, \$3,000,000 available at once to the Government engineering departments and the remainder July 1. It will take about eight years to complete the dredging, and it is estimated that the total improvement, including rebuilding docks and additional handling equipment, will aggregate \$75,000,000.

Pig Iron

The market is dull, both sales and inquiries having declined somewhat during the week. One producer sold 4000 tons and others smaller quantities. Shipments of a leading producer gained 35 per cent in January over December, but December was an unusually poor month in shipments because of the seasonal slowing down. Not enough shipping orders for February have been issued to indicate the trend of this month. However, there is nothing on which to base an expectation of much gain. While some foundries are getting busier, the improvement is not general. A local steel foundry has increased operations. Prices are steady at recent quotations. Foundry and malleable iron are quoted at a minimum of \$16

by Lake furnaces. For local delivery and for shipment in Michigan, \$17.50 is the established price.

Prices per gross ton at Cleveland:
N'th'n Idy., #1 1.75 to 2.25 \$17.50
S'th'n Idy., #1 1.75 to 2.25 \$16.51 to 17.01
Malleable, #1 1.75 to 2.25 17.00
Ohio silvery, #1 per cent 23.00
Stand. low phos. Valley 27.00

Prices are for Lake furnaces except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Sheets

The Fisher Body Corpn. has divided orders among several mills for several thousand tons of sheets, mostly auto body grade, for its Cleveland plant for March requirements. This plant continues to operate on a schedule of 15,000 to 18,000 bodies a week. In addition to making Chevrolet bodies, it is now producing some bodies for Buick and Oldsmobile cars. There is a fair demand from stove manufacturers for enameling stock. Orders are light from other industries and are for small lots. Some consumers who usually buy in car lots or more are ordering in less than car lots. The price spread on galvanized sheets has virtually disappeared, 2.90c., Pittsburgh, now being the ruling price. Prices on other grades are firm. Jobbers report a good volume of seasonal business in galvanized sheets.

Strip Steel

A moderate volume of business in hot-rolled strip is coming from automobile parts makers, who are ordering only for early requirements. Cold-rolled strip is very dull. Prices are well maintained at 1.55c., Pittsburgh, for wide hot-rolled strip and 1.65c. for narrow. On cold-rolled strip, there is a spread of 2.25c. to 2.35c., Cleveland, with most of the business going at the lower price.

Bolts, Nuts and Rivets

Bolt and nut business in January was virtually the same as in December. There was some gain in jobbers' orders, but these were for smaller lots than usual. The industry is operating at about 40 per cent of capacity. Rivet orders gained slightly last month over those of December. Prices are being well maintained.

Bars, Plates and Shapes

Specifications are holding up to recent volume, but do not increase. Most orders are for small lots. Bar tonnage is going largely to the automotive industry. Structural lettings are light, and fabricated prices remain low. While mills generally are holding to the 1.70c., Cleveland, base

on steel bars, some consumers who did not contract at 1.65c. are still able to get the latter price. Although plates and shapes are fairly steady at 1.65c., Pittsburgh, these appear to be subject to an occasional concession of \$1 a ton. However, not enough business in sizable orders is coming out to test the market.

Rails

The Nickel Plate Railroad has distributed its 1931 rail tonnage, amounting to 27,400 tons, 50 per cent having been awarded to the Carnegie and Illinois Steel companies and 25 per cent each to the Inland and Bethlehem companies. Track accessories are still pending.

Wire Products

There is a moderate increase in orders for manufacturers' wire from bolt and nut makers. The price is firm at 2.20c., Cleveland. Orders for nails and fence from the jobbing trade show quite a pickup. While mills quote nails at \$1.90 a keg, some of the jobbers are naming the same price for car lots for mill shipment.

Old Material

Some scrap is moving between dealers to fill outstanding orders with Ohio and western Pennsylvania mills, but local mills are taking no scrap and there is no new demand from consumers. The market is weak and prices are about 25c. a ton lower on a number of the more active grades. For delivery to mills outside of Cleveland, dealers made small-lot purchases during the week at \$12 for heavy melting steel and \$7.25 for borings and turnings.

Prices per gross ton delivered (exclusive of cartage):

Basic Open-Hearth Grades	
No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting steel	9.75 to 10.00
Compressed sheet steel	9.25 to 9.50
Light hot-rolled sheet	8.00 to 8.25
Stampings	8.00 to 8.50
Drop forge flashings	4.75 to 5.25
Machine shop turnings	7.00 to 7.25
Short sheaving turnings	9.50 to 10.00
No. 1 railroad wrought	10.00 to 10.50
No. 2 railroad wrought	8.50 to 9.00
No. 1 busheling	12.50 to 13.00
Pipes and flues	9.50 to 10.00
Steel axle turnings	9.50 to 10.00
Acid Open-Hearth Grades	
Low phos. billet blooms and slab crops	16.50 to 17.00
Blast Furnace Grades	
Cast iron borings	7.25 to 7.50
Mixed borings and short turnings	7.25 to 7.50
No. 2 busheling	6.50 to 6.75
Cupola Grades	
No. 1 cast	12.00 to 12.50
Railroad grate bars	6.00 to 6.50
Stove plate	6.00 to 6.50
Rails under 3 ft.	15.00 to 16.50
Miscellaneous	
Rails for rolling	15.00 to 16.50
Railroad malleable	12.50 to 13.00

NEW YORK

Steel Demand Flattens Out—Pig Iron Sales 5500 Tons

NEW YORK, Feb. 3.—The pig iron market has shown no notable change for better or worse. Bookings, at 5500 tons, compare with 4500 tons in the previous week and 6000 tons two weeks ago. The largest single sale was 1200 tons. The brokers sold 3000 tons in the first two days of the current week, but it is of course impossible to say whether this is an augury for improvement or a lull in the year. Foundry work, as gauged by pig iron and coke specifications, has shown little gain since the initial peak after inventory shortages, but molasses are figuring on an increasing amount of work and are in some cases sounding out the market for more metal. Until some of the prospective castings business materializes, however, it will be impossible to estimate to what extent the trade has covered its second quarter requirements. Meanwhile, formal inquiries are few.

The Worthington Pump & Machinery Corp. is in the market for 800 tons of foundry iron and 300 tons of malleable for Buffalo and 100 tons of No. 3 foundry and 150 tons of No. 1 for Elmwood Place, Ohio.

Prices remain flexible but show no new trends. On Alabama foundry iron, \$10.50, Birmingham, appears to be rather firm as a minimum, with some sellers asking \$11.

Special grades of steel, delivered New York City:
 10-24, N. 2, 24, 40, 47, \$20.41 to \$20.91
 10-24, N. 2, 24, 40, 47, 18.28 to 18.58
 10-24, N. 2, 24, 40, 47, 17.98 to 18.38
 10-24, N. 2, 24, 40, 47, 17.88 to 18.28

Weight rates: 14.21 from Buffalo, \$1.20
 14.21 from eastern Pennsylvania.
 *Prices delivered to New Jersey cities
 based on a net of \$1.25 a ton from Buffalo.

Finished Steel

Steel sales in this district flattened out in the past week. The improvement of the second and third weeks of January did not gather momentum, and in some instances was not maintained. However, a few sales offices report a moderate gain in the number of inquiries and have hopes that February will bring a better volume of business than January. Some of the promising tennage is in pipe line projects, several of which, requiring a total of 100,000 tons or more of pipe, are maturing and may be let within the next month or two. Structural steel activity is in moderate volume. The extent of the prospective rise in construction work in the spring is still uncertain. So far as inquiries for steel are a gauge. The most favorable feature of the situation is the continued firmness of prices, but the fact is that most of the orders are so

small that there has been no severe test of the current quotations.

Cast Iron Pipe

Pressure pipe buying has been small, but a number of large privately owned utilities have not yet closed on their 1931 pipe requirements and substantial inquiry is expected in the next few weeks. Municipal pipe buying continues decidedly small. Formal quotations are unchanged, but concessions to buyers who are willing to accept winter delivery are still being granted.

Special grades of steel, delivered New York City:
 10-24, N. 2, 24, 40, 47, \$20.41 to \$20.91
 10-24, N. 2, 24, 40, 47, 18.28 to 18.58
 10-24, N. 2, 24, 40, 47, 17.98 to 18.38
 10-24, N. 2, 24, 40, 47, 17.88 to 18.28

Warehouse Business

Sales by jobbers in this district have shown a slight improvement in the past week, but total business is still small. Prices are being maintained with only occasional concessions on the larger orders.

Reinforcing Bars

Prices are unchanged, although mills have adopted a firmer position, leaving little margin between the mill price and current quotations by distributors. New projects requiring bars are limited in number, but call for some substantial totals. Highway construction in Burlington and Atlantic counties, N. J., will require about 1150 tons of bars and the Plaza sec-

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.10c
Soft steel bars, small shapes	3.10c
Iron bars, 1/2 in. and larger	3.24c
Iron bars, 1/2 in. and larger	3.24c
Cast-iron, shafting and screw stock—	
Rounds and hexagons	3.40c
Plate and squares	3.90c
Cast-iron, strip, soft and quarter	
Hard	4.35c
Soft	3.75c
Blue annealed sheets (No. 10)	3.25c
Blue annealed sheets (No. 24)	3.25c
Galvanized sheets (No. 24)	4.00c
Long term sheets (No. 24)	3.00c
Standard tool steel	12.00c
Wire black annealed	4.35c
Wire galv. annealed	3.10c
Wire steel, 1/2 x 1/2 in. and larger	3.40c
Smooth finish, 1 to 2 1/2 x 1/2 in. and larger	3.75c
Upwardly sloped steel, 1/2 in. and larger	4.75c to 5.00c

*No. 24 and 24 1/2 in. wide 24	
Water jet 100 lb.	
Machine tools, cut thread	Per 100 Lb.
1/2 x 1/2 in. and smaller	30 to 40 and 10
1/2 x 1/2 in. and smaller	30 to 40 and 10
Machine tools, cut thread	
1/2 x 1/2 in. and smaller	30 to 40 and 10
1/2 x 1/2 in. and smaller	30 to 40 and 10
Machine tools, cut thread	
1/2 x 1/2 in. and smaller	30 to 40 and 10
1/2 x 1/2 in. and smaller	30 to 40 and 10
Machine tools, cut thread	
1/2 x 1/2 in. and smaller	30 to 40 and 10
1/2 x 1/2 in. and smaller	30 to 40 and 10

tion of the Kill van Kull bridge, being built by the Port of New York Authority, will take 305 tons of bar.

Coke

Foundry coke specifications are spotty, with reports of declines offsetting reports of improvement. Foundry coke prices range from \$2.50 a net ton, Connellsville, and foundry coke quotations follow:

Special brands of best quality foundry coke, \$4.75 to \$4.85 a net ton, evened, at \$4.75 to \$4.85, delivered to northern New Jersey, Jersey City and Newark, and \$4.25 to \$4.41 to New York and Brooklyn. The highest quality coke, \$4.75 to \$4.85, New York and Jersey City, \$4.00 to \$4.10, New York and Jersey City.

Old Material

Brokers are paying \$10 and \$10.25 a ton for No. 1 heavy melting steel, delivered to a mill at Claymont, Del., and \$10.50 a ton, delivered Coatesville, Pa. Heavy breakable cast scrap is inactive, with the price unsteady. A Harrisburg, Pa., consumer is offering to pay only \$11 a ton, delivered, and a Florence, N. J., foundry consumer of this grade is offering \$10.50 a ton, delivered. Other grades of scrap are quiet.

Dealers' buying prices per gross ton, f.o.b. New York

No. 1 heavy melting steel	\$8.50 to \$7.00
Heavy melting steel (various)	5.00 to 5.25
No. 1 hvy. breakable cast	5.75 to 5.25
Stove plate (steel works)	4.75 to 5.00
Locomotive grate bars	4.75 to 5.00
Machine shop turnings	3.50
Short shoveling turnings	3.50
Cast borings (blast fur. or steel works)	3.50
Mixed borings and turnings	3.00
Steel car axles	14.00
Iron car axles	17.50 to 18.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)	7.25
Forge fire	7.00
No. 1 railroad wrought	8.75
No. 1 yard wrought, long	7.75
Rolls for rolling	3.25 to 3.75
Stove plate (foundry)	5.50 to 6.00
Malleable cast (railroad)	9.50 to 10.00
Cast borings (chemical)	8.50 to 9.00

Prices per gross ton, delivered local foundries:

No. 1 machy. cast	\$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.)	10.50
No. 2 cast (radiators, cast boilers, etc.)	10.00

Chard Lathe Co. Sold

The Western Machine Tool Works, Holland, Mich., has purchased the complete business of the Chard Lathe Co., Newcastle, Ind. The Chard plant and equipment were recently put up for sale at public auction. The Western Machine Tool Works will manufacture the full line of Chard lathes at its plant at Holland, Mich. Production will be started at once.

Traffic Club of Pittsburgh will hold its annual dinner on Thursday, March 5, in the ballroom of the William Penn Hotel.

PHILADELPHIA

Mill Operations Substantially Unchanged—Buying Light

PHILADELPHIA, Feb. 3.—Steel orders and specifications against contracts have been slightly smaller in the past week, but most mills consider it as only a temporary lull. Most of the eastern Pennsylvania producers are still operating at about 40 per cent. The leading independent interest, aided by substantial rail contracts, maintained an average of 40 per cent open-hearth output in the latter part of January and plans to run at upward of 50 per cent this month.

Automobile body builders and accessory manufacturers are operating better than for some months, but their steel requirements are still small. Two of the leading radio manufacturers in this district are still operating at a fair rate, but are converting stocks of material into finished sets, and are expected to decrease output soon. Structural steel fabricators are in need of contracts and only bidding on a small tonnage of new projects. Boiler and tank fabricators, which were moderately well engaged recently, are completing orders and report but few new contracts in prospect.

Pig Iron

Orders for foundry iron are mostly in carload lots for immediate shipment. Consumers are still operating on a greatly reduced scale, few foundries reporting any increase in the volume of new business on their books. Stocks of pig iron on furnace yards are still sizable. Quotations are unchanged at \$17 to \$17.50 a ton, f.o.b. eastern Pennsylvania furnace. Southern pig iron is quoted at \$11 a ton, Birmingham, for foundry grade in small lots, and \$10.50 for medium-sized tonnages.

Prices per gross ton at Philadelphia

East. Pa. No. 2, 1.75 to 2.25 sil.	\$17.75 to \$18.75
East. Pa. No. 2N, 2.25 to 2.75 sil.	18.25 to 19.25
East. Pa. No. 1X, 1.75 to 2.25 sil.	18.75 to 19.75
Basic (old) east. Pa., 1.75 to 2.25 sil.	17.25 to 17.50
Malleable, 1.90 to 2.00 sil.	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.25
Va. No. 2N, 2.25 to 2.75 sil.	22.75

Prices, except as specified otherwise, are delivered Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.51 from Virginia furnaces.

Steel Bars

Buying is irregular and limited to small lots to cover immediate needs of consumers. The price is firm at 1.60c. a lb., Pittsburgh, or 1.89c., Philadelphia, with 1.65c., Pittsburgh, or 1.94c., Philadelphia, quoted on small, miscellaneous specifications. Reinforcing bar distributors continue to offer bars

for new projects at 1.65c., Pittsburgh, or 1.94c., Philadelphia. Rail steel bars are quoted at 1.50c., Franklin, Pa., or 1.79c., Philadelphia.

Shapes

Eastern Pennsylvania mills are quoting 1.70c. a lb., f.o.b. nearest mill to consumer, or 1.76c., Philadelphia, only occasionally offering a concession of \$1 a ton from this price, when a substantial tonnage is involved. Fabricating shops are in need of new business, especially the smaller fabricators, who compete for buildings rather than bridges and large public work.

Plates

Boiler and tank shops in this district are slightly less active, but a fair tonnage of plates will be placed soon for shipbuilding requirements, including about 12,000 tons for vessels to be built for the Eastern Steamship Co. One shipbuilder in this district has received shipments of plates and shapes by barge from Sparrows Point, Md. Plate prices are unchanged at 1.50c. a lb., f.o.b. Coatesville, or 1.80 1/2c., Philadelphia, and on small, miscellaneous specifications, 1.75c., Coatesville, or 1.85 1/2c., Philadelphia, is quoted.

Sheets

Automobile manufacturers are increasing their output, but have bought only small tonnages of sheets. Radio manufacturers are expected to reduce their output considerably in the next few weeks before entering into their 1931 season of production. While demand for sheets has been unusually small in this district in the past week, mills are receiving some fair-sized orders from other territories. Black sheet quotations are unchanged at 2.35c., Pittsburgh, or 2.64c., Philadelphia, and galvanized sheets continue at 2.90c., Pittsburgh, or 3.19c.,

Warehouse Prices, f.o.b. Philadelphia

	Rate per lb.
Plates, 3/4-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforce, steel bars, sq. twisted and deform.	2.60c. to 2.60c.
Cold-fin. steel, rounds and hex.	2.40c.
Cold-fin. steel, sq. and flats	2.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to 16-in. thick	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.60c.
Galvanized sheets (No. 21)	4.15c.
Light plates, blue annealed (No. 10)	2.60c.
Blue annealed sheets (No. 13)	2.90c.
Diam. pat. floor plates, 3/4-in.	2.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more, 10 to 40 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
For 50 bundles or more, 10 to 40 bun., 4.95c. base; 1 to 9 bun., 5.20c. base.

Philadelphia. Blue annealed sheets, No. 13 gage, are 2.05c., Pittsburgh, or 2.34c., Philadelphia, and blue annealed plates, No. 10 gage, are 1.90c., Pittsburgh, or 2.19c., Philadelphia, except on the narrower widths, which, in competition with the product of the continuous mill, are sometimes quoted at 1.75c., Pittsburgh, or 2.05c., Philadelphia.

Imports

In the week ended Jan. 31, 3392 tons of pig iron was received at this port from British India, and 1000 tons of chrome ore arrived from Portuguese Africa. Other arrivals consisted of 26 tons of iron bars and 2 tons of strip steel from Sweden.

Old Material

All grades of iron and steel scrap continue quiet, and prices are unchanged. A Claymont, Del., consumer is reported to be willing to close on a small tonnage of No. 1 heavy melting steel at not to exceed \$10.75, delivered. The low bidder on about 1000 tons of submarine scrap in car sizes, which is at the Philadelphia Navy Yard, was Julius H. Kaplan, Chester, Pa., who quoted \$5.37 a ton, f.o.b., the Navy Yard.

Prices per gross ton delivered consumer's yards, Philadelphia district

No. 1 heavy melting steel	\$10.00 to \$11.00
No. 2 heavy melting steel	9.00 to 9.25
Heavy melting steel (yard)	8.50
No. 1 railroad wrought	12.00 to 12.50
Rounded sheets (for steel worker)	9.00
Hydraulic compressed, new	9.00 to 10.00
Hydraulic compressed, old	8.00 to 8.50
Machine shop turnings (for steel worker)	6.50 to 7.50
Heavy axle turnings (for equity)	9.50 to 10.00
Cast borings (for steel works and roll. mill)	7.50
Heavy breakable cast (for steel works)	11.00 to 11.50
Railroad grate bars	9.00
Stove plate (for steel worker)	9.00
No. 1 low phos. b'ys., 0.01% and under	17.00 to 18.00
Combers and knuckles	15.50 to 16.00
Roller steel wheels	15.50 to 16.00
No. 1 blast furnace scrap	6.50 to 7.00
Weld. iron and soft steel pipes and tubes (new specification)	11.50 to 12.00
Shafting	18.00
Steel axles	18.00 to 18.50
No. 1 forge fire	11.00
Cast iron carwheels	12.50 to 14.00
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	12.50 to 13.00

Orders for enameled sanitary ware in 1930 totaled 2,418,559 pieces, against 3,674,574 in 1929, according to reports received by the Bureau of the Census from manufacturers. Orders last December totaled 138,390 pieces, compared with 182,603 in November.

February gets under way the outlook is favorable for further growth. Road machinery builders are taking a strong lead in pressing output. There is a noticeable gain in production of tillage machinery, and tractor building stands as an important item in mid-Western activity. Automobile plants tributary to the Chicago market, though not gaining in production, are holding to steady schedules.

Coke

January shipments of by-product foundry coke gained slowly but steadily as January advanced, and releases now at hand promise more extensive use in February. The price is steady at \$8 a ton, local ovens.

Reinforcing Bars

January, though better than December in contracts, was a disappointing month. Week after week the hopes of reinforcing bar sellers have been sustained by a substantial volume of estimating, but the mortality among projects has been unusually high. Public work, though still considered promising, is slow in developing. For instance, bids have been rejected three times on some Chicago schools, and now the Stickney sanitary job has struck a snag in the letting of the general contract. Additional road lettings have been made but contractors are slow in buying the necessary reinforcing bars. Probably not less than 2500 tons will be ordered for paving contracts that have been awarded by the State of Illinois and various counties in the State.

Plates

Shipments of skelp from Chicago mills to Milwaukee are increasing, as pipe manufacture at that point increases. The A. O. Smith Corp. has taken from the Engineers' Public Service Co. an order for a pipe line that will extend from El Paso, Tex., into Mexico. This line will be 275 miles long and will require 30,000 tons of pipe. The first order involves 70 miles of the line. In addition to this favorable turn in events, Western mills have received upward of 2000 tons of releases by various tank builders and also some shipping orders for bridge work recently awarded. There are few active inquiries for tankage, but it is reported that the outlook in this field is promising. If Western railroads have plans for new cars they are keeping the subject very quiet. The only order of note is for 14 gas-electric cars placed by the Santa Fe. Taken as a whole, the Western plate market is gaining strength, but it still lacks the support of railroad business.

Wire Products

A leading producer of wire and wire products is announcing, effective at once, that prices for bright annealed and galvanized wire to the merchant trade will hereafter be the same as those named to the manufacturing trade. That is, there will be only one price for each product and

all buyers will be on the same basis. Quotations will be 2.20c. a lb., Pittsburgh, for bright wire; 2.35c. for annealed wire and 2.80c. for the galvanized product. Demand for wire and wire products is slowly gaining headway and output has been advanced slightly to a range of 40 to 45 per cent of capacity. Some contractors have started to place orders for concrete mesh, and concrete pipe makers in the South are beginning to take tonnages. Paving programs are large, and there is every reason to believe that the movement of mesh will be heavy throughout the spring months. The copper cable market is quiet in sales, but specifications are larger. The jobbing trade remains spotty and, on the whole, not larger than in the closing days of January.

Structural Material

Among the most important projects that will come out for figures in the next few days is the development program of Inland Steel Co. This involves a new strip and continuous sheet mill, for which 10,000 to 12,000 tons of structural steel will be used. It is also likely that the South approach and the bascule bridge for the Outer Drive, Chicago, will be out for figures early this month. Interesting from the viewpoint of steel mill expansion in this district is the announcement that Wisconsin Steel Co. is planning two new mill buildings. Highway bridge work continues to be a feature of the market as States as far west as New Mexico and Montana place tonnages.

Old Material

Continued pressure to move a volume of scrap that exceeds consumption and the unwillingness of consumers to build larger stock piles have definitely turned the local scrap iron and steel market to the weak side. The most recent sale of heavy melting steel was at \$10.25 a gross ton, delivered, and offers at this figure are unattractive, largely because mill stocks are of ample size, considering current

ingot output and also because some dealers have seen fit to consign cars to mills at a faster rate than they can be handled. It is said that about 100 cars are waiting to be unloaded at one mill. This situation is being resisted by users, who have tightened on inspections, with resultant heavy rejections.

Weather in the Middle West remains open, and therefore is favorable for gathering, preparing and moving scrap. Some yard operators now wish to turn their stocks, which normally at this time of year would be frozen and buried under snow. Within a very short time after railroad scrap is sold, shipments come out on track. Practically all market factors are contributing to the congestion of distress tonnage. Use of scrap by foundries remains small and spotty. The smaller units hesitate to order beyond nearby requirements and therefore specialties seldom move in more than single carloads. Taken as a whole, the market seems to be more affected by the disappointment in the scrap trade than by the general business situation.

Prices deliv'd Chicago district consumers:

Per Gross Ton	
Basic Open-Hearth Grades:	
Heavy melting steel.....	\$10.00 to \$10.25
Shoveling steel.....	10.00 to 10.25
Frogs, switches and guards, cut apart, and misc. rails	10.50 to 11.00
Factory hyd. comp. sheets	8.50 to 9.00
Drop forge flashings....	7.50 to 8.00
No. 1 busheling.....	7.25 to 7.75
Forg'd cast and r'd steel carwheels.....	13.00 to 13.50
Railroad tires, charg. box size.....	13.00 to 13.50
Railroad leaf springs cut apart.....	13.00 to 13.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles	12.00 to 12.50
Coil springs.....	13.25 to 13.75
Electric Furnace Grades:	
Axle turnings.....	11.00 to 11.50
Low phos. punchings....	11.50 to 12.00
Low phos. plates, 12 in. and under.....	11.50 to 12.00
Blast Furnace Grades:	
Axle turnings.....	8.50 to 9.00
Cast iron borings.....	4.75 to 5.00
Short shoveling turnings..	4.50 to 5.00
Machine shop turnings....	4.25 to 4.75
Rolling Mill Grades:	
Iron rails.....	11.00 to 11.50
Rerolling rails.....	12.00 to 12.50
Cupola Grades:	
Steel rails, less than 3 ft..	12.00 to 12.50
Steel rails, less than 2 ft..	12.50 to 13.00
Angle bars, steel.....	11.50 to 12.00
Cast iron carwheels.....	10.50 to 11.00
Malleable Grades:	
Railroad.....	12.25 to 12.75
Agricultural.....	11.25 to 11.50
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heavier.....	26.00 to 31.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars.	10.50 to 11.00
Iron arch bars, and transoms.....	11.00 to 11.50
Iron car axles.....	19.00 to 20.00
Steel car axles.....	13.00 to 13.50
No. 1 railroad wrought....	8.00 to 8.50
No. 2 railroad wrought....	8.50 to 9.00
No. 1 busheling.....	6.00 to 6.50
No. 2 busheling.....	4.00 to 4.50
Locomotive tires, smooth..	12.50 to 13.00
Pipes and flues.....	5.50 to 6.00
Cupola Grades:	
No. 1 machinery cast....	9.50 to 10.00
No. 1 railroad cast.....	9.00 to 9.50
No. 1 agricultural cast....	8.50 to 9.00
Stove plate.....	7.75 to 8.25
Grate bars.....	7.50 to 8.00
Brake shoes.....	7.75 to 8.25

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

Base per Lb.	
Plates and structural shapes.....	3.00c.
Soft steel bars.....	2.90c.
Reinforcing bars, billet steel.....	2.00c.
Rail steel reinforcement.....	1.50c. to 1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.35c.
Flats and squares.....	3.85c.
Bands $\frac{7}{8}$ in. (in Nos. 10 and 12 gages).....	3.10c.
Hoops (No. 14 gage and lighter)...	3.65c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Blue ann'l'd sheets (No. 10).....	3.35c.
Spikes ($\frac{7}{8}$ in. and larger).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	4.00c.
Rivets, boiler.....	4.00c.
Per Cent Off List	
Machine bolts.....	.60 and 10
Carriage bolts.....	.60 and 10
Coach and lag screws.....	.60 and 10
Hot-pressed nuts, sq., tap. or blank,	.60 and 10
Hot-pressed nuts, hex., tap. or blank,	.60 and 10
No. 8 black ann'l'd wire, per 100 lb..	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c't'd nails, base per keg....	2.30

CLEVELAND

Halt Occurs in Uptrend of Steel Orders

CLEVELAND, Feb. 3.—The uptrend in the demand for finished steel seems to have halted. Specifications the past week were in about the same volume as during the previous week. Orders are fairly numerous, but for small lots. Cleveland steel plants are operating at 50 per cent of ingot capacity, the same as during the previous week. Demand from the automotive industry this month is not expected to show much change from January. Aside from Ford and Chevrolet, only two or three motor car companies are operating well.

The first activity in Lake shipbuilding in some time is the award of three barges by the Ford Motor Co. to the Great Lakes Engineering Works. These will require 4500 tons of steel. The boats will be 300 ft. long, of the canal type, and it is understood that they will be used for transporting automobile parts from the Ford plant to New York by Lake Erie and the Barge Canal.

Important work in improving the Lake waterways will be started shortly by the Federal Government. This will be accomplished by increasing the depth of water to 26 ft. in the Lake channels and ports and will provide an impetus toward the rebuilding of Lake docks and the installations of new mechanical-handling facilities and perhaps a stimulus for building new Lake boats, as deeper channels will allow the operation of larger boats than at present. For this work, \$26,000,000 has been appropriated, \$3,000,000 available at once to the Government engineering departments and the remainder July 1. It will take about eight years to complete the dredging, and it is estimated that the total improvement, including rebuilding docks and additional handling equipment, will aggregate \$75,000,000.

Pig Iron

The market is dull, both sales and inquiries having declined somewhat during the week. One producer sold 4000 tons and others smaller quantities. Shipments of a leading producer gained 35 per cent in January over December, but December was an unusually poor month in shipments because of the seasonal slowing down. Not enough shipping orders for February have been issued to indicate the trend of this month. However, there is nothing on which to base an expectation of much gain. While some foundries are getting busier, the improvement is not general. A local steel foundry has increased operations. Prices are steady at recent quotations. Foundry and malleable iron are quoted at a minimum of \$16

by Lake furnaces. For local delivery and for shipment in Michigan, \$17.50 is the established price.

Prices per gross ton at Cleveland:
N'th'n fdy., sil. 1.75 to 2.25.....\$17.50
S'th'n fdy., sil. 1.75 to 2.25.....\$16.51 to 17.01
Malleable 17.50
Ohio silvery, 8 per cent..... 25.00
Stand. low phos., Valley..... 27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Sheets

The Fisher Body Corp'n. has divided orders among several mills for several thousand tons of sheets, mostly auto body grade, for its Cleveland plant for March requirements. This plant continues to operate on a schedule of 15,000 to 18,000 bodies a week. In addition to making Chevrolet bodies, it is now producing some bodies for Buick and Oldsmobile cars. There is a fair demand from stove manufacturers for enameling stock. Orders are light from other industries and are for small lots. Some consumers who usually buy in car lots or more are ordering in less than car lots. The price spread on galvanized sheets has virtually disappeared, 2.90c., Pittsburgh, now being the ruling price. Prices on other grades are firm. Jobbers report a good volume of seasonal business in galvanized sheets.

Strip Steel

A moderate volume of business in hot-rolled strip is coming from automobile parts makers, who are ordering only for early requirements. Cold-rolled strip is very dull. Prices are well maintained at 1.55c., Pittsburgh, for wide hot-rolled strip and 1.65c. for narrow. On cold-rolled strip, there is a spread of 2.25c. to 2.35c., Cleveland, with most of the business going at the lower price.

Bolts, Nuts and Rivets

Bolt and nut business in January was virtually the same as in December. There was some gain in jobbers' orders, but these were for smaller lots than usual. The industry is operating at about 40 per cent of capacity. Rivet orders gained slightly last month over those of December. Prices are being well maintained.

Bars, Plates and Shapes

Specifications are holding up to recent volume, but do not increase. Most orders are for small lots. Bar tonnage is going largely to the automotive industry. Structural lettings are light, and fabricated prices remain low. While mills generally are holding to the 1.70c., Cleveland, base

on steel bars, some consumers who did not contract at 1.65c. are still able to get the latter price. Although plates and shapes are fairly steady at 1.65c., Pittsburgh, these appear to be subject to an occasional concession of \$1 a ton. However, not enough business in sizable orders is coming out to test the market.

Rails

The Nickel Plate Railroad has distributed its 1931 rail tonnage, amounting to 27,400 tons, 50 per cent having been awarded to the Carnegie and Illinois Steel companies and 25 per cent each to the Inland and Bethlehem companies. Track accessories are still pending.

Wire Products

There is a moderate increase in orders for manufacturers' wire from bolt and nut makers. The price is firm at 2.20c., Cleveland. Orders for nails and fence from the jobbing trade show quite a pickup. While mills quote nails at \$1.90 a keg, some of the jobbers are naming the same price for car lots for mill shipment.

Old Material

Some scrap is moving between dealers to fill outstanding orders with Ohio and western Pennsylvania mills, but local mills are taking no scrap and there is no new demand from consumers. The market is weak and prices are about 25c. a ton lower on a number of the more active grades. For delivery to mills outside of Cleveland, dealers made small-lot purchases during the week at \$12 for heavy melting steel and \$7.25 for borings and turnings.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel...	\$10.00 to \$10.50
No. 2 heavy melting steel...	9.75 to 10.00
Compressed sheet steel...	9.25 to 9.50
Light bundled sheet	
stampings	8.00 to 8.25
Drop forge flashings.....	8.00 to 8.50
Machine shop turnings...	4.75 to 5.25
Short shoveling turnings...	7.00 to 7.25
No. 1 railroad wrought...	9.50 to 10.00
No. 2 railroad wrought...	10.00 to 10.50
No. 1 busheling	8.50 to 9.00
Pipes and flues	5.50 to 6.00
Steel axle turnings.....	9.50 to 10.00
Acid Open-Hearth Grades:	
Low phos., billet bloom and slab crops.....	16.50 to 17.00
Blast Furnace Grades:	
Cast iron borings.....	7.25 to 7.50
Mixed borings and short turnings	7.25 to 7.50
No. 2 busheling	6.50 to 6.75
Cupola Grades:	
No. 1 cast	12.00 to 12.50
Railroad grate bars	6.00 to 6.50
Stove plate	6.00 to 6.50
Rails under 3 ft.....	16.00 to 16.50
Miscellaneous:	
Rails for rolling	15.00 to 15.50
Railroad malleable	12.50 to 13.00

NEW YORK

Steel Demand Flattens Out—Pig Iron Sales 5500 Tons

NEW YORK, Feb. 3.—The pig iron market has shown no notable change for better or worse. Bookings, at 5500 tons, compare with 4500 tons in the previous week and 6000 tons two weeks ago. The largest single sale was 1200 tons. One broker sold 3900 tons in the first two days of the current week, but it is of course impossible to say whether this is an augury for improvement or a flash in the pan. Foundry melt, as gaged by pig iron and coke specifications, has shown little gain since the initial pick-up after inventory shutdowns, but melters are figuring on an increasing amount of work and are in some cases sounding out the market for more metal. Until some of this prospective castings business materializes, however, it will be impossible to estimate to what extent the trade has covered its second quarter requirements. Meanwhile, formal inquiries are few.

The Worthington Pump & Machinery Corp. is in the market for 800 tons of foundry iron and 300 tons of malleable for Buffalo and 100 tons of No. 3 foundry and 150 tons of No. 1 for Elmwood Place, Ohio.

Prices remain flexible but show no new trends. On Alabama foundry iron, \$10.50, Birmingham, appears to be rather firm as a minimum, with some sellers asking \$11.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil.	1.75	
to 2.25		\$20.41 to \$20.91
*Buff. No. 2, del'd east.		
N. J.		18.28 to 19.28
East. Pa. No. 2 fdy., sil.		
1.75 to 2.25		17.39 to 18.39
East. Pa. No. 2X fdy., sil.		
2.25 to 2.75		17.89 to 18.89

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Finished Steel

Steel sales in this district flattened out in the past week. The improvement of the second and third weeks of January did not gather momentum, and in some instances was not maintained. However, a few sales offices report a moderate gain in the number of inquiries and have hopes that February will bring a better volume of business than January. Some of the promising tonnage is in pipe line projects, several of which, requiring a total of 100,000 tons or more of pipe, are maturing and may be let within the next month or two. Structural steel activity is in moderate volume. The extent of the prospective rise in construction work in the spring is still uncertain, so far as inquiries for steel are a gage. The most favorable feature of the situation is the continued firmness of prices, but the fact is that most of the orders are so

small that there has been no severe test of the current quotations.

Cast Iron Pipe

Pressure pipe buying has been small, but a number of large privately owned utilities have not yet closed on their 1931 pipe requirements and substantial inquiry is expected in the next few weeks. Municipal pipe buying continues decidedly small. Formal quotations are unchanged, but concessions to buyers who are willing to accept winter delivery are still being granted.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$37.90 to \$38.90; 4-in. and 5-in., \$40.90 to \$41.90; 3-in., \$47.90 to \$48.90. Class A and gas pipe, \$3 extra.

Warehouse Business

Sales by jobbers in this district have shown a slight improvement in the past week, but total business is still small. Prices are being maintained with only occasional concessions on the larger orders.

Reinforcing Bars

Prices are unchanged, although mills have adopted a firmer position, leaving little margin between the mill price and current quotations by distributors. New projects requiring bars are limited in number, but call for some substantial totals. Highway construction in Burlington and Atlantic counties, N. J., will require about 1150 tons of bars and the Plaza sec-

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Blue ann'd sheets (No. 10)	3.25c.
Black sheets (No. 24*)	3.50c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	5.00c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	.65 to .65 and 10
1 x 30 in. and smaller	.65 to .65 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller	.65 to .65 and 10
¾ x 20 in. and smaller	.65 to .65 and 10
Boiler Tubes:	Per 100 Ft.
Lap welded, 2-in.	\$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

tion of the Kill van Kull bridge, being built by the Port of New York Authority, will take 305 tons of bars.

Coke

Foundry coke specifications are spotty, with reports of declines offsetting reports of improvement. Furnace coke prices range from \$2.50 to \$2.60 a net ton, Connellsville, and foundry coke quotations follow:

Special brands of beehive foundry coke, \$4.70 to \$4.85 a net ton, ovens, or \$8.41 to \$8.56, delivered to northern New Jersey, Jersey City and Newark, and \$9.29 to \$9.44 to New York and Brooklyn; by-product foundry coke, \$9 to \$9.40, Newark or Jersey City; \$10.06, New York or Brooklyn.

Old Material

Brokers are paying \$10 and \$10.25 a ton for No. 1 heavy melting steel, delivered to a mill at Claymont, Del., and \$10.50 a ton, delivered Coatesville, Pa. Heavy breakable cast scrap is inactive, with the price unsteady. A Harrisburg, Pa., consumer is offering to pay only \$11 a ton, delivered, and a Florence, N. J., foundry consumer of this grade is offering \$10.50 a ton, delivered. Other grades of scrap are quiet.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	\$6.50 to \$7.00
Heavy melting steel (yard)	5.00 to 5.25
No. 1 hvy. breakable cast	6.75 to 7.25
Stove plate (steel works)	4.75 to 5.00
Locomotive grate bars	4.75 to 5.00
Machine shop turnings	3.50
Short shovelling turnings	3.50
Cast borings (blast fur. or steel works)	3.50
Mixed borings and turnings	3.00
Steel car axles	14.00
Iron car axles	17.50 to 18.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)	7.25
Forge fire	7.00
No. 1 railroad wrought	8.75
No. 1 yard wrought, long	7.75
Rails for rolling	9.25 to 9.75
Stove plate (foundry)	5.50 to 6.00
Malleable cast (railroad)	9.50 to 10.00
Cast borings (chemical)	8.50 to 9.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	\$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.)	10.50
No. 2 cast (radiators, cast boilers, etc.)	10.00

Chard Lathe Co. Sold

The Western Machine Tool Works, Holland, Mich., has purchased the complete business of the Chard Lathe Co., Newcastle, Ind. The Chard plant and equipment were recently put up for sale at public auction. The Western Machine Tool Works will manufacture the full line of Chard lathes at its plant at Holland, Mich. Production will be started at once.

Traffic Club of Pittsburgh will hold its annual dinner on Thursday, March 5, in the ballroom of the William Penn Hotel.

PHILADELPHIA

Mill Operations Substantially Unchanged—Buying Light

PHILADELPHIA, Feb. 3.—Steel orders and specifications against contracts have been slightly smaller in the past week, but most mills consider it as only a temporary lull. Most of the eastern Pennsylvania producers are still operating at about 40 per cent. The leading independent interest, aided by substantial rail contracts, maintained an average of 46 per cent open-hearth output in the latter part of January and plans to run at upward of 50 per cent this month.

Automobile body builders and accessory manufacturers are operating better than for some months, but their steel requirements are still small. Two of the leading radio manufacturers in this district are still operating at a fair rate, but are converting stocks of material into finished sets, and are expected to decrease output soon. Structural steel fabricators are in need of contracts and only bidding on a small tonnage of new projects. Boiler and tank fabricators, which were moderately well engaged recently, are completing orders and report but few new contracts in prospect.

Pig Iron

Orders for foundry iron are mostly in carload lots for immediate shipment. Consumers are still operating on a greatly reduced scale, few foundries reporting any increase in the volume of new business on their books. Stocks of pig iron on furnace yards are still sizable. Quotations are unchanged at \$17 to \$17.50 a ton, f.o.b. eastern Pennsylvania furnace. Southern pig iron is quoted at \$11 a ton, Birmingham, for foundry grade in small lots, and \$10.50 for medium-sized tonnages.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	17.76 to 18.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	18.26 to 19.26
East. Pa. No. 1X, 1.75 to 2.25 sil.	18.76 to 19.76
Basic (del'd east. Pa.)	17.25 to 17.50
Malleable	19.00 to 20.00
Stand. low phos. (f.o.b. east. Pa. furnace)	23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Steel Bars

Buying is irregular and limited to small lots to cover immediate needs of consumers. The price is firm at 1.60c. a lb., Pittsburgh, or 1.89c., Philadelphia, with 1.65c., Pittsburgh, or 1.94c., Philadelphia, quoted on small, miscellaneous specifications. Reinforcing bar distributors continue to offer bars

for new projects at 1.65c., Pittsburgh, or 1.94c., Philadelphia. Rail steel bars are quoted at 1.50c., Franklin, Pa., or 1.79c., Philadelphia.

Shapes

Eastern Pennsylvania mills are quoting 1.70c. a lb., f.o.b. nearest mill to consumer, or 1.76c., Philadelphia, only occasionally offering a concession of \$1 a ton from this price, when a substantial tonnage is involved. Fabricating shops are in need of new business, especially the smaller fabricators, who compete for buildings rather than bridges and large public work.

Plates

Boiler and tank shops in this district are slightly less active, but a fair tonnage of plates will be placed soon for shipbuilding requirements, including about 12,000 tons for vessels to be built for the Eastern Steamship Co. One shipbuilder in this district has received shipments of plates and shapes by barge from Sparrows Point, Md. Plate prices are unchanged at 1.70c. a lb., f.o.b. Coatesville, or 1.80½c., Philadelphia, and on small, miscellaneous specifications, 1.75c., Coatesville, or 1.85½c., Philadelphia, is quoted.

Sheets

Automobile manufacturers are increasing their output, but have bought only small tonnages of sheets. Radio manufacturers are expected to reduce their output considerably in the next few weeks before entering into their 1931 season of production. While demand for sheets has been unusually small in this district in the past week, mills are receiving some fair-sized orders from other territories. Black sheet quotations are unchanged at 2.35c., Pittsburgh, or 2.64c., Philadelphia, and galvanized sheets continue at 2.90c., Pittsburgh, or 3.19c.,

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c.
Structural shapes	2.50c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Reinforc. steel bars, sq. twisted and deform.	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.15c.
Steel bands, No. 12 to ¼-in. inclu.	2.90c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.60c.
†Galvanized sheets (No. 24)	4.15c.
Light plates, blue annealed (No. 10)	3.05c.
Blue ann'd sheets (No. 13)	3.20c.
Diam. pat. floor plates, ¼-in.	5.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 40 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Philadelphia. Blue annealed sheets, No. 13 gage, are 2.05c., Pittsburgh, or 2.34c., Philadelphia, and blue annealed plates, No. 10 gage, are 1.90c., Pittsburgh, or 2.19c., Philadelphia, except on the narrower widths, which, in competition with the product of the continuous mill, are sometimes quoted at 1.75c., Pittsburgh, or 2.05c., Philadelphia.

Imports

In the week ended Jan. 31, 3399 tons of pig iron was received at this port from British India, and 1000 tons of chrome ore arrived from Portuguese Africa. Other arrivals consisted of 26 tons of iron bars and 2 tons of strip steel from Sweden.

Old Material

All grades of iron and steel scrap continue quiet, and prices are unchanged. A Claymont, Del., consumer is reported to be willing to close on a small tonnage of No. 1 heavy melting steel at not to exceed \$10.75, delivered. The low bidder on about 1000 tons of submarine scrap in car sizes, which is at the Philadelphia Navy Yard, was Julius H. Kaplan, Chester, Pa., who quoted \$5.37 a ton, f.o.b., the Navy Yard.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$10.00 to \$11.00
No. 2 heavy melting steel	9.00 to 9.25
Heavy melting steel (yard)	8.50
No. 1 railroad wrought	12.00 to 12.50
Bundled sheets (for steel works)	9.00
Hydraulic compressed, new	9.00 to 10.00
Hydraulic compressed, old	8.00 to 8.50
Machine shop turnings (for steel works)	6.50 to 7.50
Heavy axle turnings (or equiv.)	9.50 to 10.00
Cast borings (for steel works and roll. mill)	7.50
Heavy breakable cast (for steel works)	11.00 to 11.50
Railroad grate bars	9.00
Stove plate (for steel works)	9.00
No. 1 low phos., hvy., 0.04% and under	17.00 to 18.00
Couplers and knuckles	15.50 to 16.00
Rolled steel wheels	15.50 to 16.00
No. 1 blast f'nace scrap	6.50 to 7.00
Wrot. iron and soft steel pipes and tubes (new specific.)	11.50 to 12.00
Shafting	18.00
Steel axles	18.00 to 18.50
No. 1 forge fire	11.00
Cast iron carwheels	13.50 to 14.00
No. 1 cast	12.00 to 12.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	12.50 to 13.00

Orders for enameled sanitary ware in 1930 totaled 2,418,559 pieces, against 3,674,574 in 1929, according to reports received by the Bureau of the Census from manufacturers. Orders last December totaled 138,390 pieces, compared with 182,603 in November.

BIRMINGHAM Price Reduction Has Not Stimulated Pig Iron Buying

BIRMINGHAM, Feb. 3.—Pig iron demand is still influenced largely by consumption requirements despite the recent price reduction. Additional melters are reported to have covered February and March requirements, but considerable iron is yet to be sold for those two months. Shipments in January were much better than in December. No definite base price has been established on No. 2 foundry iron for district delivery, but most of the sales are at \$13, which is \$1 under the recent base price.

The total of furnaces at blast remains at 10, the same as for the past three weeks. One steel mill furnace is on basic iron and two others are alternated between basic and foundry iron. One stack continues to produce recarburizing iron and the others are on foundry.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:
No. 2 fdy., 1.75 to 2.25 sil. \$13.00 to \$13.50
No. 1 fdy., 2.25 to 2.75 sil. 13.50 to 14.00
Basic 13.00 to 13.50

Finished Steel

There was a slow but steady expansion in the finished steel market during January. Excepting steel rails, last week was considered the best since November. Several days of favorable weather have quickened specifications on orders placed. Demand was general throughout the month and all lines received better attention. Orders are still small for nearby needs. The jobbing trade continues sluggish, and very little inclination is shown toward building up warehouse stocks. The market for wire products is looking up some with approach of the spring buying season. Prices on bars, plates and shapes hold their recent firmness. Galvanized sheet quotations are off \$1 a ton at 3.10c. to 3.15c., while blue annealed and black sheet prices are unchanged.

The Tennessee company is operating six of nine open-hearths at Ensley, an increase of one. Active open-hearths at Fairfield remain at seven of eight. The Gulf States Steel Co. is working three of six at Alabama City, the same as last week.

Demand for reinforcing bars is holding up, being a little stronger than at the beginning of the year. Structural steel fabricators report a light week.

Cast Iron Pipe

Bookings of pressure pipe producers were off last week as compared with the recent active market, but prospective tonnage continued to develop. Some additional utility tonnage has been placed, but this type of buying so far this year has been less than last year. Recent favorable weather for construction has brought in a few rush specifications and a light gain in shipments. New orders of the American Cast Iron Pipe Co. include 350 tons for Laurel, Miss., and 175 tons for San Bernardino, Cal.

Bids are being opened this week on 2500 tons of 6 and 8-in. pipe for Detroit, 300 tons for St. Louis, 300 tons for Memphis, Tenn., and 500 tons for Roswell, N. M. Price shading from figures of \$37 to \$38, base Birmingham, is reported to be more common.

Old Material

Steel mills are relying mostly on stocks and old orders for all require-

ments. Demand is said to be much lighter than at this time last year. The market for cast grades is still depressed.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$10.50 to \$11.00
Scrap steel rails.....	10.50
Short shoveling turnings..	9.00
Cast iron borings.....	9.00
Stove plate.....	9.00
Steel axles.....	19.00
Iron axles.....	18.00
No. 1 railroad wrought....	10.00
Rails for rolling.....	11.50 to 12.00
No. 1 cast.....	11.00 to 11.25
Tramcar wheels.....	11.00 to 11.25
Cast iron borings, chem....	13.50
Cast iron carwheels.....	11.00

ST. LOUIS January Pig Iron Shipments Make Favorable Showing

ST. LOUIS, Feb. 3.—Activities in pig iron in this area consist chiefly of shipments against contracts. New orders are in small amounts for immediate use. January shipments to melters in the district made a good showing, the volume having been well over that of December and comparing favorably with that of January, 1929. Some jobbing and stove foundries have stepped up their operations slightly, but generally the melt has not broadened as compared with the middle of January. Prices are steady, with reports of No. 2 Southern iron having been bought on a basis of \$10.50, Birmingham.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.....	\$17.50
Malleable, f.o.b. Granite City.....	17.50
N'th'n No. 2 fdy., deliv'd St. Louis.	19.66
Southern No. 2 fdy., deliv'd.....	14.92
Northern malleable, deliv'd.....	19.66
Northern basic, deliv'd.....	19.66

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Steel

Aside from a few small, scattered jobs, awards of reinforcing concrete bars and structural steel failed to materialize during the past week. Fabricators have further curtailed their working forces, with several plants entirely down. Warehouse business in

January was disappointing. The spurt during the first 10 days exhausted itself, and since that time extreme dullness has prevailed in all departments. Producers and distributors of sheets and plates report the final week of January the slowest of the month. The Illinois State Highway Commission will take bids this week on about 1500 tons of concrete reinforcing bars.

Old Material

Iron and scrap steel is quiet. With railroad offerings continuing in considerable volume, the price list has given way in spots. Heavy melting steel, certain grades of rails, No. 1 railroad wrought and borings were reduced fractionally, several of these items, incidentally, reaching a new low point on the present downward movement. Shipments of material against recent orders is in fair volume, with few requests for delayed delivery. Following are the latest railroad lists: Missouri-Kansas-Texas, 7 cars; St. Louis-San Francisco, 50 cars; Missouri Pacific, 90 cars; Baltimore & Ohio, 10,880 tons; Big Four, 19 cars; Peoria Eastern, 3 cars; Chicago & North Western, 56 cars.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel.....	\$10.50 to \$11.00
No. 1 heavy melting or shoveling steel.....	9.50 to 10.00
No. 2 heavy melting or shoveling steel.....	9.00 to 9.50
No. 1 locomotive tires.....	11.00 to 11.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart...	10.50 to 11.00
Railroad springs.....	13.00 to 13.50
Bundled sheets.....	6.50 to 7.00
No. 2 railroad wrought....	9.50 to 10.00
No. 1 busheling.....	7.00 to 7.50
Cast iron borings and shoveling turnings.....	6.50 to 7.00
Iron rails.....	9.50 to 10.00
Rails for rolling.....	11.25 to 11.75
Machine shop turnings....	4.00 to 4.50
Heavy turnings.....	7.50 to 8.00
Steel car axles.....	14.50 to 15.00
Iron car axles.....	20.00 to 20.50
Wrot iron bars and trans.	11.50 to 12.00
No. 1 railroad wrought....	7.50 to 8.00
Steel rails, less than 3 ft.	13.00 to 13.50
Steel angle bars.....	9.50 to 10.00
Cast iron carwheels.....	10.50 to 11.00
No. 1 machinery cast.....	9.75 to 10.25
Railroad malleable.....	10.50 to 11.00
No. 1 railroad cast.....	9.75 to 10.25
Stove plate.....	8.00 to 8.50
Relay. rails, 60 lb. and under.....	16.00 to 16.50
Relay. rails, 70 lb. and over.....	20.00 to 21.00
Agricult. malleable.....	9.50 to 10.00

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shafting, screw stock.....	3.60c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	4.60c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.10c.
Galv. corrug. sheets.....	4.70c.
Structural rivets.....	4.15c.
Boiler rivets.....	4.15c.
Per Cent Off List	
Tank rivets, 7/8-in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	60
Carriage bolts.....	60
Lag screws.....	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

CINCINNATI Improvement in Pig Iron and Steel Business in January Slight

CINCINNATI, Feb. 3.—While January brought a slight improvement in sales of pig iron, no definite uptrend has materialized. Following about 10 days of fair sales, the market lapsed again into quiet. Demand during the remainder of the month reflected the reluctance of melters to cover for more than their immediate requirements. In the past week, sales totaled about 2000 tons, of which the largest was 300 tons of Northern foundry iron. Foundries are still operating on low schedules. The only sizable inquiry is for 500 tons of Northern foundry iron from a central Indiana consumer.

Prices per gross ton, deliv'd Cincinnati:
Ala. fdy., sil. 1.75 to 2.25..\$14.19 to \$14.69
Ala. fdy., sil. 2.25 to 2.75.. 14.69 to 15.19
Tenn. fdy., sil. 1.75 to 2.25. 14.19 to 14.69
S'th'n Ohio silvery, 3 per cent 24.39

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Finished Steel

Fresh bookings of sheets increased last week sufficiently to bring the month's business above the December level. The leading interest in this district indicates satisfaction with the improved demand and predicts continued improvement throughout the quarter. Operations last week were better than in the previous week.

Coke

Following the covering of fuel needs during the first part of January, shipments of foundry coke tapered to about the December level. New business is negligible. The price on by-product foundry coke will continue at about \$9, delivered in Cincinnati, during February.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
New billet reinf. bars.....	3.15c.
Rail steel reinf./orc. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.35c.
Cold-fin. rounds and hex.....	3.80c.
Squares.....	4.30c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets.....	4.20c.
Small rivets.....	.60 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (25 kegs or more).....	2.95
Cement c't'd nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in. 4-in.	\$16.50
Seamless steel boiler tubes, 2-in. 4-in.	17.50
	36.00

Old Material

The partial lifting of the suspension of shipments on scrap contracts has brought a better feeling to the district market. Dealers' bids, however, are unchanged. New business is infrequent.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$10.00 to \$10.50
Scrap rails for melting.....	10.50 to 11.00
Loose sheet clippings.....	5.50 to 6.00
Bundled sheets.....	8.75 to 9.25
Cast iron borings.....	4.50 to 5.00
Machine shop turnings.....	5.00 to 5.50
No. 1 busheling.....	8.00 to 8.50
No. 2 busheling.....	4.50 to 5.00
Rails for rolling.....	11.50 to 12.00
No. 1 locomotive tires.....	11.00 to 11.50
No. 2 railroad wrought.....	9.50 to 10.00
Short rails.....	14.75 to 15.25
Cast iron carwheels.....	10.50 to 11.00
No. 1 machinery cast.....	14.00 to 14.50
No. 1 railroad cast.....	12.00 to 12.50
Burnt cast.....	6.50 to 7.00
Stove plate.....	6.50 to 7.00
Brake shoes.....	6.50 to 7.00
Agricultural malleable.....	12.00 to 12.50
Railroad malleable.....	13.00 to 13.50

BOSTON

13,000 Tons of Steel Required for East Boston Tunnel

BOSTON, Feb. 3.—Pig iron sales the past week did not exceed 1300 tons, and included a small tonnage of Indian No. 2X at \$20 a ton, on dock, here, duty paid. It is expected that the General Electric Co., the Rhode Island Malleable Iron Co., a Connecticut foundry and several small New England foundries will close this week on inquiries. Small foundries are buying for prompt shipment, but the larger users have specified deferred deliveries. Prices are holding.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25..\$19.91 to \$20.91	
*Buffalo, sil. 2.25 to 2.75.. 19.91 to 20.91	
*Ala., sil. 1.75 to 2.25..... 21.11	
*Ala., sil. 2.25 to 2.75..... 21.61	
†Ala., sil. 1.75 to 2.25..... 17.25	
†Ala., sil. 2.25 to 2.75..... 17.75	

Freight rates: \$4.91 all rail from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Structural Steel

Fabricators are figuring on section A of the East Boston tunnel, in which there will be about 12,000 tons of plate work and 1000 tons of structural steel. It is expected that 10,000 tons of steel for the Boston Post Office will be let this week. New prospects include a court house and police station at Newton, Mass., and a Mount Holyoke College (Hadley, Mass.) unit, requiring about 500 tons for both jobs.

Reinforcing Steel

Lettings the past week totaled 1300 tons, including 1000 tons for Maine highways, 145 tons for a Fall River, Mass., Post Office and about 155 tons in small lots. Dealers are figuring on a Holyoke, Mass., telephone building, a college unit at Hadley, Mass., and a newspaper publishing plant at Manchester, N. H., the three jobs calling

for about 325 tons. It is intimated that 1000 tons for a New England Telephone & Telegraph Co. building at Watertown, Mass., and 1500 tons for the Boston Post Office will be let this week. Prices are steady as follows: 1 to 5-ton lots, 3c. a lb., base, from stock; 6 to 99-ton lots, 2.50c. to 2.55c.; 100-ton lots and larger, 2.30c., for billet steel bars; 2.26½c. a lb., delivered Boston rate points, for rail steel bars.

Cast Iron Pipe

Woonsocket, R. I., has placed its 1931 pipe requirements with the Warren Foundry & Pipe Co. and not with the United States Pipe & Foundry Co., as first reported. The Warren Foundry & Pipe Co. has sold 300 tons of 6, 8 and 12-in. gas pipe to a utility company, 100 tons of 8-in. to Waltham, Mass., 50 tons of 6-in. and 64 tons of 8-in., a total of 114 tons to Hartford, Conn., while the Donaldson Iron Co. has sold 100 tons of 8-in. pipe and special castings to Nahant, Mass. Pembroke, Mass., closes bids Feb. 10, on 1845 tons of pipe and 25 tons of standard castings. Quincy, Mass., has closed bids on 200 tons of 4, 6, 8 and 10-in. stock. Another utility company this week will place a round tonnage of 4, 6 and 8-in. gas pipe and will probably split the business between two foundries. The market is holding at \$36 a ton for 6-in. and larger pipe. A \$3 differential is asked on Class A and gas pipe.

Old Material

Some weakness in No. 1 heavy melting steel and scrap rail prices has developed in sympathy with Pittsburgh district markets, but hardly enough material was bought the past week to establish local values. The American Steel & Wire Co., Worcester, Mass., continues to take scattered car lots of long bundled skeleton, for

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates.....	3.36½c.
Structural shapes—	
Angles and beams.....	3.36½c.
Tees.....	3.36½c.
Zees.....	3.36½c.
Soft steel bars, small shapes.....	3.26½c.
Reinforcing bars.....	3.11½c. to 3.26½c.
Iron bars—	
Refined.....	3.26½c.
Best refined.....	4.60c.
Norway rounds.....	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth.....	5.00c. to 10.00c.
Crucible.....	12.00c.
Tire steel.....	4.50c. to 4.75c.
Bands.....	4.015c. to 5.00c.
Hoop steel.....	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.....	3.50c. to 5.50c.
Squares and flats.....	4.00c. to 6.00c.
Toe calk steel.....	6.00c.
Rivets, structural or boiler.....	4.80c.
Per Cent Off List	
Machine bolts.....	.60 and 5
Carriage bolts.....	.60 and 5
Lag screws.....	.60 and 5
Hot-pressed nuts.....	.60 and 5
Cold-punched nuts.....	.60 and 5
Stove bolts.....	.70 and 10

which brokers are paying \$6 to \$6.10 a ton, on cars shipping point. There is a limited market for breakable cast at \$6 to \$6.50 a ton, on cars, but the scrap market otherwise is lifeless.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel..	\$6.75 to	\$7.00
Scrap T rails	6.50 to	6.75
Scrap girder rails	5.50 to	5.75
No. 1 railroad wrought...	7.00 to	7.50
Machine shop turnings....	2.00 to	2.60
Cast iron borings (steel works and rolling mill)	2.00 to	2.60
Bundled skeleton, long....	6.00 to	6.10

Forged flashings	5.75 to	6.10
Blast furnace borings and turnings	2.00 to	2.60
Forge scrap	5.00 to	6.10
Shafting	12.50 to	13.50
Steel car axles	14.00 to	15.00
Wrought pipe, 1 in. in diameter (over 2 ft. long)	6.50 to	7.00
Rails for rolling	8.50 to	9.00
Cast iron borings, chemical	9.00 to	9.60
No. 2 cast	5.10 to	5.60

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$10.50 to	\$11.00
No. 1 machinery cast....	11.50 to	12.00
Stove plate	7.00 to	7.25
Railroad malleable	13.00 to	13.50

took 100 tons for a school in San Francisco and 240 tons for a bridge at Felton, Cal. The Columbia Steel Co. booked 600 tons for two bridges for the Western Pacific Co., San Francisco. Bids have been opened on 480 tons for a high school in Oakland, and bids will be called for shortly on 2000 tons for the Lafayette Square Apartments in San Francisco. Plain material continues to range from 2.15c. to 2.25c., c.i.f. Foreign shapes are quoted generally at 1.50c., c.i.f., duty paid, and in several instances as low as 1.35c. has been quoted.

PACIFIC COAST

Moderate Gain in Steel Demand, Particularly for Building

SAN FRANCISCO, Jan. 31.—(By Air Mail.)—Some improvement in demand for steel products is noted. Awards this week were fairly numerous. The Clinton Construction Co., San Francisco, has been awarded the general contract for the new Ford Motor Co. plant in Seattle, calling for 4000 tons of structural shapes. That city will shortly call for bids on 740 miles of copper wire and 3500 tons of transmission towers for a line connecting the city with the Diablo power house.

Bars

The reinforcing steel bar market is more active. Awards included 300 tons for the foundations for the War Memorial Building, San Francisco, placed with the Pacific Coast Steel Corp., and 100 tons for a theater in Phoenix, booked by the Colorado Fuel & Iron Co. Unnamed interests secured 250 tons for a store at 541 South Broadway, Los Angeles, and 200 tons and 100 tons respectively for two apartment buildings in the same city. Bids have been opened on 200 tons for the Webster Street pier, Oakland, and on 203 tons for a high school in Oakland. Out-of-stock prices in the Los Angeles and San Francisco districts are fairly firm at 2.50c., base, on carload lots.

Plates

The Lacy Mfg. Co. has booked 605 tons for a 42 to 48-in. riveted steel pipe line for Los Angeles, and the California Steel Products Co. took 100 tons for small tanks for the Associated Oil Co., San Francisco. Most of the new inquiries call for lots of from 50 to 80 tons. Prices range from 2.05c. to 2.15c., c.i.f.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Soft steel bars.....	3.40c.
Black sheets (No. 24).....	4.35c.
Blue ann'l'd sheets (No. 10).....	3.80c.
Galv. sheets (No. 24).....	5.00c.
Struc. rivets, 1/2-in. and larger.....	5.00c.
Com. wire nails, base per keg.....	\$3.35
Cement c't'd nails, 100 lb. keg.....	3.35

Pig iron prices per gross ton at San Francisco:

*Utah basic.....	\$22.00 to	\$24.00
*Utah fdy., sil. 2.75 to 3.25	22.00 to	24.00
**Indian fdy., sil. 2.75 to 3.25	22.00 to	24.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Shapes

Among the larger structural awards were 550 tons for a store at 541 South Broadway, Los Angeles, and 270 tons for an addition to a hospital in San Francisco, secured by the McClintic-Marshall Co. The Judson-Pacific Co.

YOUNGSTOWN

YOUNGSTOWN, Feb. 3.—For the first week in February, iron and steel companies in the Youngstown district continue production schedules at 45 to 50 per cent, with 26 of 51 independent open-hearth furnaces in service. Further expansion is predicted for February by steel company executives.

The 450-ton blast furnace at Low-ellville, Mahoning County, of the Sharon Steel Hoop Co., Sharon, Pa., was put in blast on Jan. 31, it having been idle since Oct. 1 last. During the interim it was repaired and overhauled. This resumption gives the district nine active blast furnaces of 34. It follows recent resumption of blast furnaces by the Republic Steel Corp. of its 1200-ton stack at Warren; two 850-ton furnaces at Campbell of the Youngstown Sheet & Tube Co., and one of the Sheet & Tube stacks in its Hubbard group. During Christmas week only three blast furnaces in the Youngstown district were active.

At Farrell, Pa., the Carnegie Steel Co. has placed its blooming mill on three 8-hr. turns instead of two 10-hr. shifts, as heretofore, and has added four hours a day to the working hours of the rolling mills.

The Youngstown Sheet & Tube continues to average 50 per cent, and is maintaining this rate by activity in its steel pipe and tinsplate departments. The Republic Steel Corp. averages 40 per cent; Newton Steel,

Cast Iron Pipe

The only award of importance went to the American Cast Iron Pipe Co. and called for 184 tons of 20-in. Class B pipe for San Bernardino, Cal. Bids have been opened on 100 tons for the improvement of Beacon Hill, Seattle. Los Angeles will open bids Feb. 10 on 2270 tons of 6 and 8-in. Class 150 pipe.

Track Material

The city of Seattle will open bids Feb. 6 for the construction of 2.09 miles of double track and for 200 rolled steel car wheels. The Southern Pacific Co., San Francisco, has opened bids on approximately 1400 tons of track spikes.

Valley Steel Operations 45 to 50 Per Cent

70, and Carnegie Steel, 50. The Carnegie company expects to add to its active blast furnaces at the Ohio Works in Youngstown at an early date. At present, only one of this group of six stacks is in blast.

25,000 Bethlehem Employees Own \$17,000,000 Stock

Twenty-five thousand employees have become stockholders of Bethlehem Steel Corp. during the past eight years, on the basis of an annual savings program, according to E. G. Grace, president. The investment of the employees in Bethlehem stock totals \$17,000,000.

Under the 1931 employees saving and stock ownership plan, employees may purchase the 7 per cent cumulative preferred stock at \$121 a share and pay for it over a period of 28 months, at \$4 a share monthly. Though the offering price is \$121 a share, the subscriber owns the stock outright after paying \$109.10 a share in installments, as the dividends and \$3 of the special benefits more than offset the 5 per cent interest on the unpaid balances during the installment period. Employees receive special benefits, in addition to the \$7 dividend, of \$1 a share the first year, \$2 the second, \$3 the third, \$4 the fourth, and \$5 in the fifth year of their ownership of each annual issue.

BUFFALO Bethlehem Plant Again Increases Operations— Pig Iron Demand Gains

BUFFALO, Feb. 3.—A slightly better demand for pig iron developed in this territory the past week. Sales totaled about 6000 tons. Among pending inquiries is one from Providence, R. I., for 1000 tons of malleable iron. The Worthington Pump & Machinery Corp. is in the market for 800 tons of foundry and Bessemer iron for its Buffalo plant and 350 tons for its Elmwood City, Ohio, plant. Current buying is mostly in small lots. Foundries are ordering out shipments against contracts a little more liberally.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25.....	\$17.50
No. 2X fdy., sil. 2.25 to 2.75.....	18.00
No. 1 fdy., sil. 2.75 to 3.25.....	19.00
Malleable, sil. up to 2.25.....	18.00
Basic.....	17.50
Lake Superior charcoal.....	27.25

Finished Steel

The Bethlehem Steel Co. has increased operations at the Lackawanna plant to 16 open-hearth furnaces, or about 70 per cent of capacity. This is the best operation in many months. At the other Buffalo plants operations are about the same as in recent weeks. The Donner plant of Republic Steel Corp. and the Wickwire-Spencer plant have two furnaces each in service. A heavy tonnage of structural steel and reinforcing bars for State work, including bridges, roads and grade crossings, is expected in the near future, but the market at present is quiet.

Old Material

Although there is little new business in scrap, the market is somewhat more active because of the willingness of mills to take in material on old contracts more freely.

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.15c.
Reinforcing bars.....	2.95c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.60c.
Bands.....	3.50c.
Hoops.....	3.90c.
Blue ann'l'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg....	\$2.60
Black wire, base per 100 lb.....	3.20

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$10.50 to \$11.00
No. 2 heavy melting scrap.....	9.00 to 9.50
Scrap rails.....	11.00
Hydraul. comp. sheets.....	9.00 to 9.50
Hand bundled sheets.....	8.00 to 8.50
Drop forge flashings.....	9.00 to 9.50
No. 1 busheling.....	9.00 to 9.50
Hvy. steel axle turnings.....	10.50 to 11.00
Machine shop turnings.....	5.50 to 6.00
No. 1 railroad wrought.....	9.00 to 9.50

Acid Open-Hearth Grades:	
Knuckles and couplers.....	13.50 to 14.00
Coil and leaf springs.....	13.50 to 14.00
Rolled steel wheels.....	13.50 to 14.00
Low phos. billet and bloom ends.....	15.00 to 15.50

Electric Furnace Grades:	
Short shov. steel turnings.....	8.50 to 9.00

Blast Furnace Grades:	
Short mixed borings and turnings.....	5.50 to 6.00
Cast iron borings.....	5.50 to 6.00
No. 2 busheling.....	6.00

Rolling Mill Grades:	
Steel car axles.....	15.00 to 15.50
Iron axles.....	16.00 to 16.50

Cupola Grades:	
No. 1 machinery cast.....	11.00 to 11.50
Stove plate.....	9.50 to 10.00
Locomotive grate bars.....	8.25 to 9.25
Steel rails, 3 ft. and under.....	15.00 to 15.50
Cast iron carwheels.....	13.00 to 13.50

Malleable Grades:	
Industrial.....	11.00 to 12.00
Railroad.....	11.00 to 12.00
Agricultural.....	11.00 to 12.00

Special Grades:	
Chemical borings.....	9.50 to 10.00

with little or no booking for future delivery. Prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable.....	22.60

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable.....	24.00
Basic.....	20.50

Structural Steel

New business has slowed up, but large tonnages are still in prospect for closing before the end of March.

Old Material

Despite the fact that there are evidences of improvement in several branches of the iron and steel industry, the demand for scrap is slow. Consumers are buying in small lots. Dealers are still carrying large yard

stocks and, with the exception of occasional small purchases for direct shipment to consumers, are out of the market. Prices are unchanged.

Dealers' buying prices for old material:

	Per Gross Ton	Toronto	Montreal
Heavy melting steel.....	\$7.00	\$6.00	
Rails, scrap.....	7.00	6.00	
No. 1 wrought.....	6.00	8.00	
Machine shop turnings.....	2.00	2.00	
Boiler plate.....	5.00	4.50	
Heavy axle turnings.....	2.50	2.50	
Cast borings.....	2.00	2.00	
Steel borings.....	2.00	2.00	
Wrought pipe.....	2.00	2.00	
Steel axles.....	7.00	9.00	
Axles, wrought iron.....	7.00	11.00	
No. 1 machinery cast.....		10.00	
Stove plate.....		8.00	
Standard carwheels.....		8.50	
Malleable.....		8.00	
	Per Net Ton		
No. 1 mach'ry cast.....	11.00		
Stove plate.....	9.00		
Standard carwheels.....	10.00		
Malleable scrap.....	9.00		

Canadian Steel Output Down 26.6 Per Cent in 1930

TORONTO, Feb. 3.—Production of pig iron in Canada during 1930, at 747,448 gross tons, was 30.8 per cent under the high record for the industry of 1,080,160 tons in 1929. On only six occasions has the Canadian output of pig iron exceeded the million-ton mark.

Output of ferroalloys and steel dropped 25.4 per cent and 26.6 per cent respectively. Ferroalloys fell to 66,494 tons from 89,116 tons in 1929, while steel ingots and direct steel castings dropped to 1,011,743 tons from 1,378,024 tons in 1929.

Consumption of pig iron in Canada, as determined by adding the production of 747,448 tons to the imports of 13,643 tons and deducting exports of 593 tons, amounted to 760,498 tons.

December production of pig iron was 38,293 gross tons, a decline of 17 per cent from 46,360 tons reported for November and less than half the 82,632 tons produced in December, 1929. Compared with the preceding month, December showed an increase in the output of basic iron to 20,116 tons from 15,591 tons, while foundry iron dropped to 17,551 tons from 30,769 tons.

Production of ferroalloys at 3530 tons in December was 14 per cent higher than the 3087 tons reported for November.

Output of steel ingots and direct steel castings in December, at 55,101 tons, was 22 per cent under the 71,740 tons of the previous month and about two-thirds of the 82,415 tons made in December, 1929.

Sales of mechanical stokers in December by the 11 leading manufacturers reporting to the Bureau of the Census totaled 53 units of 11,736 hp., against 71 of 21,103 hp., in November. For the year 1930 they totaled 1179 stokers of 365,664 hp., compared with 1716 of 599,585 hp. in 1929.

Canada

Rail Orders Aiding Dominion Mills

TORONTO, Feb. 3.—Rail orders are aiding Canadian steel mills to a better rate of operation. With the 30,000 tons of rails for the Canadian Pacific, booked by the Algoma Steel Corp., as reported in THE IRON AGE last week, the Algoma mill is said to have 50,000 tons of rail orders on its books, enough for two months' steady rollings. The Dominion Steel & Coal Co., Sydney, N. S., recently booked 30,000 tons of rails for the Canadian National.

Pig Iron

Merchant pig iron sales again showed some improvement over those of the week preceding. Sales, however, continue to run in small lots,

▲▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲▲

Mill Prices of Semi-Finished Steel

Billets and Blooms	
	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$30.00
Rerolling, 4-in. and under 10-in., Youngstown	30.00
Rerolling, 4-in. and under 10-in., Cleveland	30.00
Rerolling, 4-in. and under 10-in., Chicago	\$2.00
Forging quality, Pittsburgh	\$6.00

Sheet Bars	
(Open Hearth or Bessemer)	
	Per Gross Ton
Pittsburgh	\$30.00
Youngstown	30.00
Cleveland	30.00

Slabs	
(8 in. x 2 in. and under 10 in. x 10 in.)	
	Per Gross Ton
Pittsburgh	\$30.00
Youngstown	30.00
Cleveland	30.00

Skelp	
(F.o.b. Pittsburgh or Youngstown)	
	Per Lb.
Grooved	1.60a
Universal	1.60a
Sheared	1.60c

Wire Rods	
(Common soft, base)	
	Per Gross Ton
Pittsburgh	\$35.00
Cleveland	35.00
Chicago	36.00

Prices of Raw Material

Ores	
Lake Superior Ores, Delivered Lower Lake Ports	
	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore	
	Per Unit
Iron ore low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	.8c to .9c
Iron ore, low phos., Swedish, average 68% iron	10.00c
Iron ore, basic or foundry, Swedish, average 65% iron	9.00c
Manganese ore, washed 52% manganese, from the Caucasus	.25c to .27c
Manganese ore, African or Indian, 50 to 52%	.24c to .26c
Manganese ore, Brazilian, 46 to 48%	.22c to .24c
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$12.25

Chrome ore, 45% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	
	Per Gross Ton
Chrome ore, 45% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$20.00
Chrome ore, 48% Cr ₂ O ₃ crude, c.i.f. Atlantic seaboard	\$22.50

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$2.50
Foundry, f.o.b. Connellsville prompt	\$3.25 to 4.75
Foundry, by-products, Ch'go ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.85 to \$1.50
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, 1/4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.65 to .75
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.15

Ferromanganese	
	Per Gross Ton
Domestic, 80%, seaboard	\$30.00 to \$35.00
Foreign, 80%, Atlantic or Gulf port, duty paid	00.00 to 00.00

Spiegeleisen	
	Per Gross Ton Furnace
Domestic, 19 to 21%	\$25.00 to \$30.00

Electric Ferrosilicon	
	Per Gross Ton Delivered
50%	\$33.50
75%	130.00

Bessemer Ferrosilicon	
	Per Gross Ton
10%	\$35.00
11%	37.00

F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
10%	\$25.00
11%	26.00
12%	27.00

Silvery Iron	
F.o.b. Jackson County, Ohio, Furnace	
	Per Gross Ton
6%	\$21.00
7%	21.50
8%	22.00
9%	22.50
10%	23.00

Other Ferroalloys	
Ferrotungsten, per lb. contained metal del'd, carloads	\$1.08
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	\$11.00c
Ferrocromium, 2% carbon	17.00c to 17.50c
Ferrocromium, 1% carbon	19.00c to 20.00c
Ferrocromium, 0.10% carbon	24.50c to 26.00c
Ferrocromium, 0.06% carbon	26.50c to 28.00c
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocobaltitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	\$91.00
Ferrophosphorus, electric 24%, f.o.b. Aniston, Ala., per gross ton	\$122.50
Silico-manganese, gross ton, delivered	\$185.00

Fluxes and Refractories

Fluorspar	
	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$15.00 to \$16.00
No. 2 lump, Illinois and Kentucky mines	\$17.00 to 18.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	\$17.00 to 17.50
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick	
Per 1000 f.o.b. Works	
High-Heat	Intermediate
Duty Brick	Heavy Duty Brick
Pennsylvania	\$43.00 to \$46.00
Maryland	43.00 to 46.00
New Jersey	50.00 to 65.00
Ohio	43.00 to 46.00
Kentucky	43.00 to 46.00
Missouri	43.00 to 46.00
Illinois	43.00 to 46.00
Ground fireclay, per ton	7.00

Silica Brick	
Per 1000 f.o.b. Works	
Pennsylvania	\$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	\$8.50 to 10.00

Magnesite Brick	
Per Net Ton	
Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick	
Per Net Ton	
Standard size	\$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
	Per Cent Off List
Machine bolts	.73
Carriage bolts	.73
Lag bolts	.73
Flow bolts, Nos. 1, 2, 3 and 7 heads	.73
Hot-pressed nuts, blank or tapped, square	.73
Hot-pressed nuts, blank or tapped, hexagons	.73
C.p.c. and t. square or hex. nuts, blank or tapped	.73
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
 †Bolts with rolled thread up to and including 1/2 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts	
	Per Cent Off List
Semi-finished hexagon nuts	.73
Semi-finished hexagon castellated nuts, S.A.E.	.73
Stove bolts in packages, P'gh.	.80, 10, 10 and 5
Stove bolts in packages, Chicago	.80, 10, 10 and 5
Stove bolts in packages, Cleveland	.80, 10, 10 and 5
Stove bolts in bulk, P'gh.	.80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Chicago	.80, 10, 10, 5 and 2 1/2
Stove bolts in bulk, Cleveland	.80, 10, 10, 5 and 2 1/2
Tire bolts	.60, 10 and 10

Discounts of 73 per cent off on bolts and nuts apply on carload business with jobbers and large consumers.

Large Rivets	
(1/2-in. and larger)	
	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.75
F.o.b. Chicago	2.85

Small Rivets	
(1/4-in. and smaller)	
	Per Cent Off List
F.o.b. Pittsburgh	.70, 10 and 5
F.o.b. Cleveland	.70, 10 and 5
F.o.b. Chicago	.70, 10 and 5

Cap and Set Screws	
(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
	Per Cent Off List
Milled cap screws	.80, 10, 10 and 5
Milled standard set screws, case hardened	.80 and 5
Milled headless set screws, cut thread	.75 and 10
Upset hex. head cap screws, U.S.S.S. thread	.85 and 10
Upset hex. cap screws, S.A.E. thread	.85 and 10
Upset set screws	.80, 10 and 5
Milled studs	.70

▲▲▲ Mill Prices of Finished Iron and Steel Products ▲▲▲

Iron and Steel Bars Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c.
F.o.b. Chicago.....	1.75c.
Del'd Philadelphia.....	1.94c.
Del'd New York.....	1.93c.
F.o.b. Cleveland.....	1.65c. to 1.70c.
F.o.b. Lackawanna.....	1.75c.
F.o.b. Birmingham.....	1.80c.
C.i.f. Pacific ports.....	2.25c.
F.o.b. San Francisco mills.....	2.25c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.....	1.75c.
F.o.b. Birmingham, mill lengths.....	1.75c. to 1.80c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.50c. to 1.55c.
F.o.b. Chicago Heights mill.....	1.60c. to 1.65c.
Del'd Philadelphia.....	1.84c. to 1.89c.

Iron

Common iron, f.o.b. Chicago.....	1.75c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.09c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c.
F.o.b. Chicago.....	1.75c.
F.o.b. Birmingham.....	1.80c.
Del'd Cleveland.....	1.83½c.
Del'd Philadelphia.....	1.85½c.
F.o.b. Coatesville.....	1.75c.
F.o.b. Sparrows Point.....	1.75c.
F.o.b. Lackawanna.....	1.75c.
Del'd New York.....	1.93c.
C.i.f. Pacific ports.....	2.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.65c.
F.o.b. Chicago.....	1.75c.
F.o.b. Birmingham.....	1.80c.
F.o.b. Lackawanna.....	1.75c.
F.o.b. Bethlehem.....	1.75c.
Del'd Cleveland.....	1.83½c.
Del'd Philadelphia.....	1.76c.
Del'd New York.....	1.90½c.
C.i.f. Pacific ports.....	2.15c. to 2.25c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.65c.
Wider than 6 in., P'gh.....	1.55c.
6 in. and narrower, Chicago.....	1.75c.
Wider than 6 in., Chicago.....	1.65c.
Cooperage stock, P'gh.....	1.90c.
Cooperage stock, Chicago.....	2.00c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.10c.
Bars, f.o.b. Chicago.....	2.10c.
Bars, Cleveland.....	2.10c.
Bars, Buffalo.....	2.10c.
Shafting, ground, f.o.b. mill.....	*2.45c. to 3.40c.
Strips, P'gh.....	2.25c. to 2.35c.
Strips, Cleveland.....	2.25c. to 2.35c.
Strips, deliv'd Chicago.....	2.53c. to 2.63c.
Strips, Worcester.....	2.50c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland.....	3.40c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)
To Merchant Trade

	Base per Keg
Standard wire nails.....	\$1.90 to \$2.00
Cement coated nails.....	1.90 to 2.00
Galvanized nails.....	3.95 to 4.05
	Base per Lb.
Polished staples.....	2.35c. to 2.45c.
Galvanized staples.....	2.60c. to 2.70c.
Barbed wire, galvanized.....	2.55c. to 2.65c.
Annealed fence wire.....	2.05c. to 2.15c.
Galvanized wire, No. 9.....	2.50c. to 2.60c.
Woven wire fence (per net ton to retailers).....	\$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage.....	2.20c. to 2.30c.
Spring wire.....	3.20c. to 3.30c.
(Carload lots, Chicago district mills)	
Wire nails.....	\$1.95 to \$2.05
Annealed fence wire.....	2.40c. (lb.)
Bright hard wire to manufacturing trade.....	2.25c.
Barbed wire, galv.....	2.60c. (lb.)

Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh.....	1.90c.
No. 10, blue annealed, f.o.b. Chicago dist.....	2.00c.
No. 10, blue annealed, del'd Phila.....	2.19c.
No. 10, blue annealed, B'ham.....	2.05c.

Sheets

	Base per Lb.
No. 13, f.o.b. P'gh.....	2.05c.
No. 13, f.o.b. Chicago dist.....	2.15c.
No. 13, del'd Philadelphia.....	2.34c.
No. 13, blue annealed, B'ham.....	2.20c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.35c.
No. 24, f.o.b. Chicago dist. mill.....	2.45c.
No. 24, del'd Philadelphia.....	2.64c.
No. 24, f.o.b. Birmingham.....	2.50c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh.....	3.60c.
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Galvanized

No. 24, f.o.b. Pittsburgh.....	2.90c.
No. 24, f.o.b. Chicago dist. mill.....	3.00c.
No. 24, del'd Cleveland.....	3.08½c.
No. 24, del'd Philadelphia.....	3.24c.
No. 24, f.o.b. Birmingham.....	3.10c. to 3.15c.

Continuous Mill Sheets

No. 10 gage.....	1.75c.
No. 13 gage.....	1.90c.

Tin Mill Black-Plate

No. 28, f.o.b. Pittsburgh.....	2.60c. to 2.70c.
No. 28, f.o.b. Chicago dist. mill.....	2.75c. to 2.80c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	3.30c.
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Long Termes

No. 24, 8-lb. coating, f.o.b. mill.....	3.35c.
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Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.70c.
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Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mills.....	\$5.00
Standard cokes, f.o.b. Gary.....	5.10

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$10.30 | 25-lb. coating I.C. \$15.20
15-lb. coating I.C. 12.90 | 30-lb. coating I.C. 16.00
20-lb. coating I.C. 14.00 | 40-lb. coating I.C. 17.80

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quantity Bar Base, 2.65c. per Lb.	
S.A.E. Series Numbers	Alloy Differential
2000 (¼% Nickel).....	\$0.25
2100 (1¼% Nickel).....	0.55
2300 (¾% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bar.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flat).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¼c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	34.00
Light (from rail steel), f.o.b. mill.....	32.00
Light (from billets, f.o.b. Ch'go mill.....	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ½ in. and larger.....	\$2.80
Spikes, ¾ in. and larger.....	2.80

Spikes, boat and barge.....	\$3.00
Tie plate, steel.....	1.95
Angle bars.....	2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	.75 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld			Iron		
Inches	Steel Black	Galv.	Inches	Black	Galv.
¾.....	47	21½	¾ and 1.....	+11	+36
1.....	53	27½	1.....	23	8
1½.....	58	44½	1 and 1½.....	31	11
2.....	62	50½	1½ and 2.....	35	18
2½.....	64	52½			
Lap Weld			Lap Weld		
2.....	57	45½	2.....	23	9
2½ to 6.....	61	49½	2½ to 3½.....	23	13
7 and 8.....	58	45½	4 to 6.....	30	17
9 and 10.....	56	43½	7 and 8.....	29	16
11 and 12.....	55	42½	9 to 12.....	26	11
Butt Weld, extra strong, plain ends			Butt Weld, extra strong, plain ends		
¾.....	43	26½	¾ and 1.....	+13	+48
1.....	49	32½	1.....	23	7
1½.....	55	44½	1½.....	28	12
2.....	60	49½	2.....	34	18
2½ to 3.....	62	51½			
3.....	63	52½			
Lap weld, extra strong, plain ends			Lap weld, extra strong, plain ends		
2.....	55	44½	2.....	29	13
2½ to 4.....	59	48½	2½ to 4.....	34	20
4½ to 6.....	58	47½	4½ to 6.....	33	19
7 to 8.....	54	41½	7 and 8.....	31	17
9 and 10.....	47	34½	9 to 12.....	21	8
11 and 12.....	46	33½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discount of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2½ in...	35	1½ in.	1
2½ in.—2¾ in...	46	1¾ in.	8
3 in.	52	2 in.—2¼ in...	13
3½ in.—3¾ in...	54	2½ in.—2¾ in...	16
4 in.	57	3 in.	17
4½ in. to 6 in...	46	3½ in to 3¾ in...	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two points on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts: Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives; Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
1 in.	61
1½ to 1¾ in.	53
1¾ in.	37
2 to 2½ in.	32
2½ to 3 in.	40
3 in.	46
3½ to 3¾ in.	43
4 in.	51
4½, 5 and 6 in.	40

Hot Rolled

2 and 2¼ in.....	38	3¼ to 3½ in....	54
2¼ and 2½ in.....	46	4 in.	57
3 in.	52	4½, 5 and 6 in...	46

Beyond the above base discount a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads).....	55
Carbon, 0.30% to 0.40% base.....	50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

Fabricated Structural Steel

New Projects of 37,000 Tons Include 13,000 Tons for Boston Tunnel—Awards Total 35,000 Tons

THE total of fabricated structural steel awards this week, 35,000 tons, compares with only 7500 tons a week ago and 17,000 tons two weeks ago. Included in the total are 12,000 tons in a bank building at Twelfth and Market Streets, Philadelphia, and 4000 tons in an assembly building in Seattle for the Ford Motor Co.

New projects are smaller this week, with a total of 37,000 tons, compared with 58,000 tons a week ago and 46,000 tons two weeks ago. A considerable part of this total, 13,000 tons, is in a section of a tunnel at East Boston. Other large projects are 6500 tons for Outer Drive bridges in Chicago, 4000 tons for a bridge at Booneville, Ark., 2000 tons for an apartment building in San Francisco, and 1000 tons for a Knights of Columbus clubhouse in Minneapolis. Awards follow:

North Atlantic States

WATERTOWN, MASS., 480 tons, New England Telephone & Telegraph Co. plant, to New England Structural Co.
NEW LONDON, CONN., 500 tons, Coast Guard unit, to an unnamed fabricator.
BANGOR & AROOSTOOK RAILROAD, 550 tons, bridge in Maine, to American Bridge Co.
NEW YORK, 200 tons, structural work for Board of Transportation, to American Bridge Co.
NEW YORK, 5000 tons, apartment building at Sixty-second Street and Central Park West, to Hay Foundry & Iron Works.
NEW YORK, 950 tons, apartment building at 2 Beekman Place, to Bethlehem Fabricators, Inc.
NEW YORK, 650 tons, apartment building at Seventh Avenue and Fifteenth Street, to Levering & Garrigues Co.
UTICA, N. Y., 140 tons, New York Central grade crossing, to McClintic-Marshall Co.
BOWMANVILLE, N. Y., 425 tons, New York Central grade crossing elimination, to McClintic-Marshall Co.
PHILADELPHIA, 820 tons, tubercular ward of General Hospital, to Morris, Wheeler & Co.
PHILADELPHIA, 347 tons, service building in Wyncote for Philadelphia Electric Co., to Belmont Iron Works.
PHILADELPHIA, 12,000 tons, building at Twelfth and Market Streets, to American Bridge Co.
STATE OF MARYLAND, 150 tons, highway bridge, to Phoenix Bridge Co.

The South

NEW ORLEANS, 600 tons, wharf, to Worden-Allen Co.

Central States

CLEVELAND, 105 tons, storage buildings for Standard Oil Co., to Burger Iron Co.
CLEVELAND, 350 tons, West Forty-first Street bridge for Big Four Railroad, to Bethlehem Steel Co.
BLOOMINGTON, IND., 725 tons, Union Building for Indiana University, to an unnamed bidder.
BLOOMINGTON, ILL., 115 tons, Post Office, to an unnamed bidder.
WAUKEGAN, ILL., 400 tons, Public Service Co. of Northern Illinois, to Mississippi Valley Structural Steel Co.
URBANA, ILL., 325 tons, skating rink, to Mississippi Valley Structural Steel Co.
ST. LOUIS, 400 tons, steel dredge pontoons for United States Government, to St. Louis Structural Steel Co.
CHICAGO & NORTH WESTERN RAILROAD, 300 tons, bridges, to Worden-Allen Co. and Milwaukee Bridge Co.

Western States

SIDNEY, MONT., 850 tons, highway bridge, to Virginia Bridge & Iron Co.
WESTERN PACIFIC RAILROAD, 760 tons, bridges, to Virginia Bridge & Iron Co. and Bethlehem Steel Co.
UNION PACIFIC RAILROAD, 125 tons, bridge, to McClintic-Marshall Co.
CHALLIS, IDAHO, 150 tons, bridge, to American Bridge Co.
ESPANOLA, N. M., 350 tons, bridge, to American Bridge Co.
LOS LONAS, N. M., 200 tons, bridge, to American Bridge Co.
LOS ANGELES, 605 tons, plates, 42 to 48-in. riveted steel pipe, to Lacy Mfg. Co.
LOS ANGELES, 550 tons, store at 541 South Broadway, to McClintic-Marshall Co.
SAN DIEGO, CAL., 325 tons, shop building at naval base, to McClintic-Marshall Co.
SAN FRANCISCO, 100 tons, school, Twenty-fifth and Noe Streets, to Judson-Pacific Co.
SAN FRANCISCO, 100 tons, plates, tanks for Associated Oil Co., to California Steel Products Co.
SAN FRANCISCO, 270 tons, addition to San Francisco hospital, to McClintic-Marshall Co.
SAN FRANCISCO, 600 tons, two bridges for Western Pacific Co., to Columbia Steel Co.
OAKLAND, CAL., 145 tons, Seventh Street crossing, to Judson-Pacific Co.
SANTA CRUZ, CAL., 240 tons, bridge over Southern Pacific Co. tracks at Felton, to Judson-Pacific Co.
SANTA ROSA, CAL., 100 tons, bridge over Sonoma Creek, to Dyer Brothers.
PORTLAND, ORE., 125 tons, Ross Island project, to Willamette Iron & Steel Works.
SEATTLE, 4000 tons, assembly building for Ford Motor Co., to Bethlehem Steel Co.

Canada

WALKERVILLE, ONT., 300 tons, subway on Wyandotte Street, to Canadian Bridge Co., Ltd.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

BOSTON, 13,000 tons, section A, East Boston tunnel.
NEW CANAAN, CONN., 200 tons, junior high school.
TROY, N. Y., 300 tons, dormitory for Rensselaer Polytechnic Institute.
PEBSKILL, N. Y., 100 tons, Senator Depew Hotel.
OXFORD, N. Y., unstated tonnage, hospital for Women's Relief Corps.

WHITE PLAINS, N. Y., 500 tons, St. Agnes' Hospital.
BROOKLYN, 150 tons, Hebrew Home for Aged.
BROOKLYN, 200 tons, addition to public school 101.
NEW YORK, 400 tons, public school 106 in Bronx.
NEW YORK, 2000 tons, Samuel Gompers High School in Bronx; Psaty & Fuhrman, New York, low bidders on general contract.
NEW YORK, 100 tons, restaurant for Horn & Hardart on West Seventy-second Street.
URBINUS, PA., 300 tons, building for Ursinus College.

The South

HAMILTON, TEX., 230 tons, penstock.
MOBILE, ALA., 120 tons, two barges for United States Engineer; bids close Feb. 11.
AUSTELL, GA., unstated tonnage, building for Clark Thread Co.
BOONEVILLE, ARK., 4000 tons, bridge.

Central States

PITTSBURGH, 250 tons, three barges for United States Engineer; bids close Feb. 28.
CLEVELAND, tonnage unstated, John Carroll University.
TOLEDO, OHIO, 325 tons, gas holder for Pure Oil Co.
CHICAGO, 700 tons, shipping mill building for International Harvester Co.
CHICAGO, 900 tons, Bessemer building for Wisconsin Steel Co.
CHICAGO, 6500 tons, steel for Outer Drive bridges.
PRAIRIE DU CHIEN, WIS., 1000 tons, bridge.
MINNEAPOLIS, 1000 tons, Knights of Columbus clubhouse.
SPRINGFIELD, ILL., 1000 tons, 13 bridges for Illinois Highway Commission.
JANESVILLE, WIS., 300 tons, Turtle Creek overhead; bids Feb. 12.
EAU CLAIRE, WIS., 100 tons, Grand Avenue bridge overhaul; Worden-Allen Co., Milwaukee, low bidder.
WAUSAU, WIS., 400 tons, Bridge Street span.

Western States

SANTA FE, N. M., 500 tons, State highway work.
STILLWATER, OKLA., 600 tons, stadium for Oklahoma Agricultural and Mechanical Arts College.
DENVER & RIO GRANDE WESTERN RAILROAD, 375 tons, bridges.
SAN FRANCISCO, 2000 tons, Lafayette Square Apartments; bids to be taken soon.
OAKLAND, CAL., 480 tons, Fremont high school; bids opened.

Canada

COBALT, ONT., 500 tons, steel bridge on Lang Street. C. H. Fullerton, Parliament Buildings, Toronto, receiving bids until Feb. 14.
OTTAWA, 100 tons, theater for A. H. & S. Coplan, 7 Clemow Avenue.

Railroad Equipment

Ford Motor Co. is inquiring for 50 to 150 gondola cars.
Missouri Pacific is taking bids on car parts involving 1000 tons of steel.
Santa Fe has ordered 15 gas electric motor cars, 12 from Pullman Car & Mfg. Corp. and two from J. G. Brill Co.
Louisiana & Arkansas is inquiring for two or three locomotives of 2-10-4 type.
Solvay Process Co. is inquiring for one to six insulated tank cars of 10,000-gal. capacity.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Lower—Tin Inactive —Lead Reduced—Zinc Higher

NEW YORK, Feb. 3.

Copper

Further reductions in prices have taken place in a sluggish market. About the middle of last week custom smelters reduced their price from 9.75c. to 9.50c., delivered in the Connecticut Valley, and on Saturday, Jan. 31, Copper Exporters, Inc., lowered the quotation from 10.30c. to 10.05c. c.i.f., usual European ports, for February, March and April, with the May price at a premium of five points, or 10.10c. Primary producers continue practically out of the market and most of the business being done is for the account of custom smelters. Since the reductions, sales abroad have increased and are considerably better this week than last. Sales to foreign consumers for January were approximately 35,000 gross tons. There is almost no buying by domestic consumers. Lake copper is also very quiet and is now quoted at 9.75c. to 9.87½c., delivered.

Copper Averages

The average price of Lake copper for January, based on daily quotations in THE IRON AGE, is 10.26c. a lb., delivered, New York. The average price of electrolytic copper is 9.79c., refinery, or 10.04c., delivered in the Connecticut Valley.

Tin

The stagnation of a week ago has given way to a little better sentiment, accompanied by more interest and a little buying. Consumers have bought small quantities for deliveries as far ahead as August as well as some spot metal but, in general, demand is very small.

Statistics for January show that American deliveries into consumption were 7210 tons and that the world's visible supply increased last month 1121 tons, bringing the total to the very high figure of 43,619 tons. Stocks of metal in British warehouses on Jan. 31 were 23,691 tons, an increase of 151 tons for the week ended that day. Stocks in the Far East increased 1200 tons during January, and it is estimated that the February production will be about 5000 tons, with shipments approximately 6500 tons.

Spot Straits tin today was quoted at 25.25c., New York. Quotations in London today were about \$3 a ton less than a week ago, with spot standard quoted at £113 12s. 6d., future standard, at £113 12s. 6d., and spot

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Feb. 3	Feb. 2	Jan. 31	Jan. 30	Jan. 29	Jan. 27
Lake copper, New York.....	9.87½	9.87½	9.87½	9.87½	10.12½	10.12½
Electrolytic copper, N. Y.*.....	9.50	9.50	9.50	9.50	9.50	9.75
Straits tin, spot, N. Y.....	25.25	25.25	....	25.50	25.40	25.75
Zinc, East St. Louis.....	4.10	4.10	4.05	4.05	4.05	4.05
Zinc, New York.....	4.45	4.45	4.40	4.40	4.40	4.40
Lead, St. Louis.....	4.40	4.55	4.55	4.55	4.55	4.55
Lead, New York.....	4.60	4.75	4.75	4.75	4.75	4.75

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Straits at £115 12s. 6d. The Singapore price today was £116 15s.

Lead

The American Smelting & Refining Co. today reduced its quotation from 4.75c. to 4.60c., New York. The corresponding price at St. Louis is now 4.40c. Business during the week has been confined to carload and small lots for prompt and early delivery, consumers covering only their immediate requirements.

Zinc

Due to an advance in the price of ore, prime Western zinc was quoted higher yesterday and today at 4.10c., East St. Louis, for prompt and February. Some metal is available for March at the same price, but later

months are at a premium, with April at 4.12½c. and May at 4.15c. Demand continues very light.

Smelters had to pay \$27 for ore at the end of last week and were able to buy only 6980 tons. Production was only moderate at 6700 tons, with shipments down to 3485 tons, which brings the ore surplus close to 53,000 tons, or the largest in over a year.

Antimony

In a rather dull market, Chinese metal is quoted at 7.12½c., New York, duty paid, with futures at 7c.

Nickel

Long established prices still prevail, and wholesale lots of ingot nickel are unchanged, at 35c. a lb., with

New York, Chicago or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	16.87½c.
*Copper, hot rolled, base sizes.....	19.50c.
<i>Seamless Tubes—</i>	
Brass	21.75c.
Copper	20.87½c.
Brass Rods.....	15.12½c.
Brazed Brass Tubes.....	24.37½c.

*Extra for cold-rolled, 3c. per lb.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9),	
casks	9.75c. to 10.25c.
Zinc sheets, open.....	10.75c. to 11.25c.

Metals from New York Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	29.00c. to 30.00c.
Tin, bar	30.00c. to 31.00c.
Copper, Lake	11.25c. to 11.75c.
Copper, electrolytic	11.00c. to 11.50c.
Copper, casting	10.75c. to 11.25c.
Zinc, slab	5.50c. to 6.50c.
Lead, American pig.....	5.87½c. to 6.87½c.
Lead, bar	7.87½c. to 8.87½c.
Antimony, Asiatic	10.00c. to 10.50c.
Aluminum No. 1 ingots	
for remelting (guaranteed over 99% pure).....	24.00c. to 25.00c.
Alum. ingots, No. 12	
alloys	23.00c. to 24.00c.
Babbitt metal, commercial	
grade	25.00c. to 35.00c.
Solder, ½ and ½.....	19.75c. to 20.75c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	30.50c.
Tin, bar	32.50c.
Copper, Lake	11.13c.
Copper, electrolytic	11.13c.
Copper, casting	10.75c.
Zinc, slab.....	5.50c.
Lead, American pig.....	5.35c. to 5.60c.
Lead, bar	8.25c.
Antimony, Asiatic	11.00c.
Babbitt metal, medium grade.....	15.25c.
Babbitt metal, high grade.....	33.50c.
Solder, ½ and ½.....	19.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.00c.	9.00c.
Copper, hvy. and wire	7.50c.	8.50c.
Copper, light and bottoms	6.75c.	7.75c.
Brass, heavy.....	4.25c.	5.25c.
Brass, light.....	3.75c.	4.50c.
Hvy. machine composition	6.75c.	7.50c.
No. 1 yel. brass turnings	4.75c.	5.25c.
No. 1 red brass or compos. turnings ..	5.75c.	7.00c.
Lead, heavy	3.50c.	4.00c.
Lead, tea	2.00c.	2.50c.
Zinc	2.00c.	2.50c.
Sheet aluminum	7.50c.	9.50c.
Cast aluminum	5.00c.	7.50c.

36c. for shot nickel and 35c. for electrolytic nickel in cathodes.

Aluminum

Virgin metal, 98 to 99 per cent pure, is obtainable at the published price of 22.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Feb. 3.—Prices for copper and tin are lower in a quiet market. Old metals are moving slowly and quotations are lower. Inquiries, however, are promising.

Prices per lb. in carload lots: Lake copper, 9.87½c.; tin, 25.75c.; lead, 4.65c.; zinc, 4.20c.; in less-than-carload lots, antimony, 8.25c. On old metals we quote copper wire, crucible shapes and copper clips, 7.50c.; copper bottoms, 6.50c. to 7c.; red brass, 6.50c. to 7c.; yellow brass, 4.50c. to 5c.; lead pipe, 3.50c. to 3.75c.; zinc, 1c. to 1.25c.; pewter, No. 1, 14.50c.; tin-foil, 15.50c.; block tin, 21.50c.; aluminum, 6c. to 6.50c.; all being dealers' prices for less-than-carload lots.

Heavy Melting Scrap Up 50c. at Detroit

DETROIT, Feb. 3.—Heavy melting steel and a few other items have advanced 50c. a ton on account of efforts of dealers to cover contract obligations. The local steel mill is specifying heavily against current contracts, but no pickup is noticeable in foundry or blast furnace grades. Scrap production of the automobile industry is expected to show a considerable gain this month.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov.	
steel	\$10.00 to \$10.50
Borings and short turnings	5.50 to 6.00
Long turnings	4.50 to 5.00
No. 1 machinery cast.	10.00 to 10.50
Automotive cast.	11.50 to 12.00
Hydraul. comp. sheets	10.00 to 10.50
Stove plate	7.25 to 7.75
New No. 1 busheling	8.00 to 8.50
Old No. 2 busheling	3.50 to 4.00
Sheet clippings	6.50 to 7.00
Flashings	7.75 to 8.25

Reinforcing Steel

Illinois State Road Work Calls for 4000 Tons

LETTINGS of reinforcing steel the past week totaled 4000 tons, compared with 6000 tons in the previous week. The largest award was 1000 tons for highways in Maine. New projects call for 7800 tons, of which 4000 tons will be used for road work in Illinois. Awards in January were 21,230 tons, compared with 11,220 tons in December and 22,050 tons in November. Awards follow:

STATE OF MAINE, 1000 tons, highways, to Bancroft & Martin Rolling Mill Co.
FALL RIVER, MASS., 145 tons, Post Office, to Concrete Steel Co.
MAMARONECK, N. Y., 150 tons, public school, to Kalman Steel Co.
NEW YORK, 750 tons, building for New York Telegram, to Carroll-McCreary Co.
NEW YORK, 200 tons, subway section 4, route 103, reported placed by Mason & Hanger Co. with Igoe Brothers.
BARAGA COUNTY, MICH., 200 tons, power plant, to Olney J. Dean & Co.
ROCK ISLAND, ILL., 100 tons, hospital, to Olney J. Dean & Co.
MILWAUKEE, 400 tons, school, to Worden-Allen Co.
PHOENIX, ARIZ., 100 tons, theater, First Street, to Colorado Fuel & Iron Co.
SAN JOSE, CAL., 146 tons, service building for County, to W. C. Hauck & Co.
SAN FRANCISCO, 300 tons, foundations for War Memorial, to Pacific Coast Steel Corp.
LOS ANGELES, 100 tons, apartment building, Hobart Street, to an unnamed bidder.
LOS ANGELES, 200 tons, apartment building, Beverly Boulevard and Gramercy Place, to an unnamed bidder.
LOS ANGELES, 250 tons, store, 541 South Broadway, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

MANCHESTER, N. H., 145 tons, newspaper plant.
HADLEY, MASS., 100 tons, Mount Holyoke College unit.

HOLYOKE, MASS., 100 tons, telephone building.

NEWARK, N. J., 300 tons, trunk line sewer.
STATE OF NEW JERSEY, 1275 tons; two highway contracts in Burlington County, 650 tons, highway in Atlantic County, 500 tons, and highway bridge in Bergen County, 125 tons.

STATE OF NEW YORK, 125 tons, building and septic tanks at Jones Beach, L. I.
NEW YORK, 305 tons, Plaza section of Kill van Kull Bridge for Port of New York Authority.

STATE OF NEW YORK, 250 tons, grade separation on Northern Parkway, Long Island.

WASHINGTON, 350 tons, building for Army Medical Corps; H. R. Blagg Co., Dayton, Ohio, general contractor.

JANESVILLE, WIS., 150 tons, Turtle Creek overhead; bids Feb. 12.

SPRINGFIELD, ILL., 4000 tons State road work; bids opened Feb. 3. This is in addition to recent tonnage.

LOS ANGELES, 100 tons, apartment building, First Street and Gramercy Place; bids opened.

OAKLAND, CAL., 203 tons, Fremont high school; bids opened.

OAKLAND, 200 tons, Webster Street pier; bids opened.

SACRAMENTO, CAL., 240 tons, paving in San Joaquin County; bids Feb. 18.

Contract for a mantle recuperator has been placed with the Surface Combustion Co. by the Youngstown Sheet & Tube Co. This will be used with a 70-ton tube reheating furnace now being installed by the Combustion company. Logan Gear Co., Toledo, has purchased an additional Surface Combustion furnace to be used for drawing to complete a normalizing, hardening and drawing unit in the production of tubular front axles for automobiles. Serval, Incorporated, Evansville, Ind., has placed an order with the Surface Combustion Co. for a galvanizing furnace. Another order received by this company is from the Spang-Chalfant Co., Inc., Pittsburgh, for a natural gas fired tube normalizing furnace with a capacity of 20 tons per hr.

STEEL RACING CAR DRIVEN 240 MILES AN HOUR

An all-steel racing automobile, with Capt. Malcolm Campbell, British driver, at the wheel, made a record run of 240 miles an hour at Daytona, Fla., on Feb. 2. This was nine miles faster than the official record of Major Segrave.



Modern Equipment Needed

Half Now Used Is Obsolete, Says Doctor Klein in Discussing Advantages of Machine Age



WASHINGTON, Feb. 3.—Half of the production equipment in the United States ought to be replaced by modern machinery, and the sooner it is replaced the better.

Declaration to this effect was made by Dr. Julius Klein, Assistant Secretary of Commerce, in an address over a nation-wide hook-up on the evening of Jan. 30. Speaking on "The Challenge of the Machine," Doctor Klein not only upheld the machine age, but vigorously emphasized its advantages.

"I think that the great majority of level-headed students of this subject view the machine as a liberator," he said. "They see it creating wealth—and not for the few alone. They recognize its prime responsibility for the rise of giant industries concerned with a vast array of new conveniences and comforts. They are grateful to it for lifting much of the age-old burden of grinding labor from the bent backs of the toilers. They conceive it as a source of unprecedented wage scales."

Doctor Klein made this observation in answer to the cry that has again been raised that machinery is racing ahead too fast, is getting "out of hand" and is one of the major factors in taking jobs away from men. This renewed agitation about the machine age prompted him to dwell on its advantages. He finds justification for believing that the activities which have ramified endlessly from the new machine-driven industries, the new jobs, especially in the so-called "service occupations," that have been brought into being by higher standards of living should eventually take care of practically all the men and women displaced by the machine. New wants, new needs for ever-varied service, it was stated, sprout with amazing luxuriance from the soil of the machine age.

Official figures of the Department of Commerce were said to show an increase of 200,000 persons employed in factories between 1927 and 1929.

"If the machine were destroying jobs, that fact would be more evident in factories than elsewhere—yet the percentage of people working in factories is larger than it was either 80 or 20 or two years ago," said Doctor Klein.

His statement that half the production equipment ought to be replaced

was based on the findings of a recent survey. He pointed out that such replacements can be made far, more easily in dull times, and that now is an especially advantageous time to buy machinery. The cost of materials is low, he said, and manufacturers can give the very closest attention to orders, assuring the best in quality, workmanship and servicing.

"If the machinery factories are set busily whirring on this greatly needed work, it will be another factor operating to pull us out of the depression," it was declared. "It would form a highly worth-while element in unemployment relief."

Technological Unemployment Discussed

Pointing out that some observers are sincerely fearful of an impending increase in "technological unemployment," Doctor Klein said that thousands of men, in specific places, have in fact been displaced by increased efficiency of machinery. Their period of shift and change, it was declared, is apt to be extremely painful and distressing. Society, and specifically employers, should aid such men to achieve a new, secure foundation of economic welfare. Doctor Klein proceeded to point out, however, the increased employment arising from the use of machinery. He quoted Franklyn Hobbs, director of research in an Illinois financial institution, as saying that "the introduction of automatic and labor-saving tools and appliances into the manufacturing industry has not reduced the amount of money paid by that industry to labor and has not displaced workers in certain industries as rapidly as avenues of employment have been opened up to them in other industries. Actually, the machine age has increased employment, increased wages, made work easier, saved lives and limbs and has enabled the workingman to live in comfort."

"Business men in distant lands have found it difficult to explain how it is possible for us to pay the high American wage and at the same time successfully export enormous quantities of manufactured goods, to compete effectively in world markets with the products of low-wage countries," said Doctor Klein. "Machinery is the answer. The industries of this country absorb \$23 worth of machinery per year per capita for our entire population. Now how much does Britain take? About \$10 worth. And Germany? Nine dollars. While across the Pacific in China the figure is 5 cents."

"American workers earn more, and

live better, because the machines available to their hands produce more. . . . Through the use of constantly improved machinery the path to progress lies."

Marketing, Not Production, the Source of Difficulties

Doctor Klein said that instead of being uniformly in the vanguard many American factories are actually falling behind—failing to keep step as they should with the progress of inventive genius and engineering achievement. He pointed to the necessity of getting rid of obsolete machinery, no matter how recently it may have been made, and of replacing it with the latest types.

"Just at this time," he said, "when industries abroad are waking up, when managers in Europe are equipping their plants with the best machinery they can find—huge quantities going from the United States for this purpose—many American manufacturers appear to be drifting into a dangerous situation where their factory equipment is relatively less effective. If this mistaken policy should be followed for some years, they can expect but one result: The awakening will come when vast sums will be needed for the rehabilitation of this equipment—and possibly under those circumstances they will not have the resources essential for that purpose."

That it is shortsighted to permit any halt in engineering and production was strongly emphasized. "Better far to stimulate our machinery of marketing and distribution," said Doctor Klein. "There is the real source of most of our present business difficulty—flagrant, preventable waste through slipshod selling methods."

Fabricated Plate Work Declined in 1930

WASHINGTON, Feb. 3.—Orders for fabricated steel plate in 1930 totaled 386,519 tons, according to reports received from 48 firms by the Bureau of the Census. This was a decline of 136,546 tons from orders received in 1929.

Bookings in December were 20,594 tons, the lowest for any month of the year, and compare with 26,137 tons booked in November.

The 1930 orders were distributed as follows: Oil storage tanks, 100,736 tons; refinery materials and equipment, 47,757 tons; tank cars, 32,327 tons; gas holders, 32,107 tons; blast furnaces, 7191 tons; miscellaneous, 166,401 tons.

The 149 establishments in the United States engaged in the manufacture of aluminum products in 1929 made sales aggregating \$115,960,000 or 76 per cent of their total output of \$152,621,000 to industrial consumers, according to the Bureau of the Census.

February Motor Car Output Now Placed at Minimum of 225,000

DETROIT, Feb. 2.

REVISED estimates of automobile production in the United States and Canada last month put the total at 175,000 to 200,000 cars, with a fair chance that official figures may reach the latter mark. The showing depends on Ford output, which will not be known for perhaps another week. There is a tendency on the part of observers to place February's performance on a higher plane than previously had been thought possible, with car assemblies ranging from 225,000 to 250,000 units.

It is now considered likely that in the first quarter the industry will manufacture the 700,000 to 750,000 cars which were predicted at the beginning of the year. Although the current rate is considerably under that in the corresponding period of 1930 and probably will lag behind last year during the entire first quarter, this fact already has been discounted. The encouraging thing is that indications point to slow but consistent gains up to the middle of the year, with the likelihood that production will still be on the upgrade at a time when it usually is falling off.

Official Government figures reveal that December output was 161,000 cars, or slightly better than had been estimated by the National Automobile Chamber of Commerce. This made the total for 1930 3,509,062 cars, compared with 5,621,709 cars in 1929, 4,601,141 in 1928 and 3,580,380 in 1927. It proved to be the poorest showing

since 1922, when 2,646,229 cars were made.

Steel Orders Have Gained

THE betterment in the automobile industry is reflected in the steel tonnage shipped by mills during January. One large maker of light-rolled products reports a gain of 5 per cent over December, another company's tonnage last month was double that of the previous month. Much of the increase was in the last 10 days of January. The support came from practically all automobile manufacturers, but the bulk of the business was from Chevrolet and Ford.

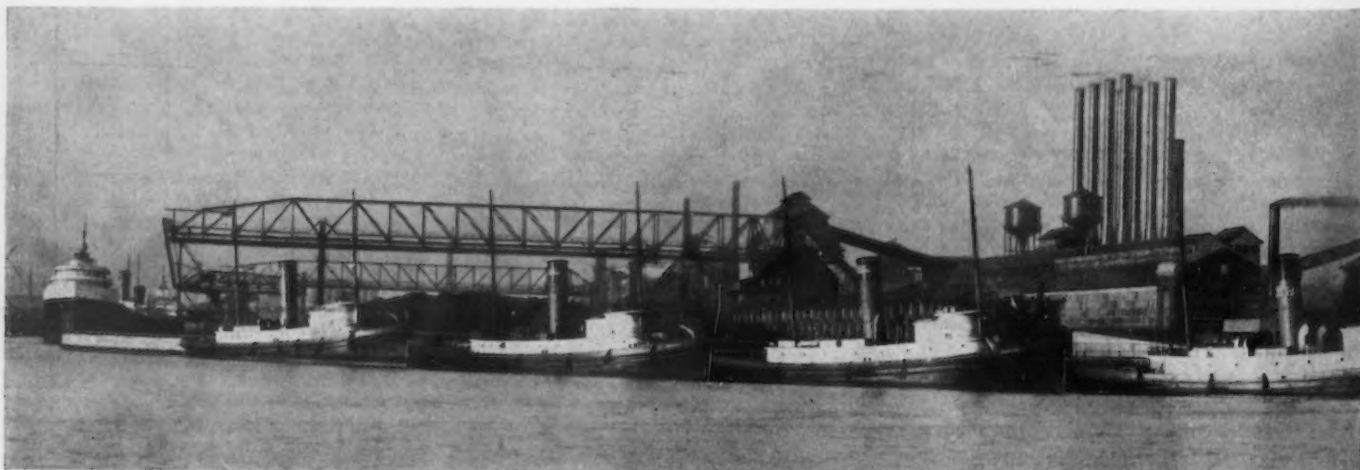
Chevrolet accounted for about 70,000 cars in January and its February schedule calls for a like number. It is said that March may see some further expansion to 75,000 to 80,000 cars. Despite the high current rate of production, Chevrolet dealers are understood to have only about six or seven cars each. Ford's January operations probably were near the 70,000 mark, with 75,000 assemblies set for this month. Auburn has surprised with a February program of 4000 cars at its Connersville and Auburn plants; it now is preparing facilities for manufacturing an additional 2000 cars monthly at Auburn, where the changeover will be completed in time to start operations by March 15. This will be in addition to the present daily capacity of 50 Cord front-drive cars and 85 Auburns. Dodge has taken on 1600 men since Christmas and now has

a working force of 10,231 men. Buick is turning out 500 cars a day, four days a week, and Studebaker 300 cars daily. Cadillac has been making 1000 cars a day, Packard 800. Oakland-Pontiac and Oldsmobile have moderate schedules. Most of the Chrysler subsidiaries are operating only fair at best, while Hupp's production still remains low.

Inventories Reduced 45 Per Cent

ONE of the economies introduced by practically all automobile makers the past year was a drastic reduction in inventories. Stocks were cut down to almost unbelievable proportions, with scarcely a plant having enough on hand to run more than a few days. To cite two examples, the annual reports of the Auburn Automobile Co. and the Peerless Motor Car Corp. reveal that both slashed inventories 45 per cent during 1930. It is no exaggeration to say that this figure would be a fairly conservative estimate for the industry as a whole.

On the other hand, there are signs that buyers are getting somewhat away from the ultra-conservative spirit which has ruled in recent months. Their trend of thought is indicated by a statement by W. S. Knudsen, president, Chevrolet Motor Co.: "With commodity prices at rock bottom, progressive manufacturers have begun buying in larger volume at the favorable prevailing prices. Where commitments for raw materials were generally made on a 30, 60 or 90-day



A view of the river front at River Rouge, Mich.,

basis, they are now commonly being made on much longer terms at advantageous prices so that the savings thus effected might be passed on in terms of lower-priced products. These long-term commitments work to the advantage of the supplier as well as the consumer, for they mean constant and steady operation of his plants and work for his employees."

DeSoto to Be Made in Plymouth Plant

IN line with its decision to remove production activities from its Highland Park plant, which will be devoted to service and parts departments, Chrysler Corp'n. has transferred the general offices and a portion of the manufacturing department of its DeSoto subsidiary to the Plymouth plant at Mount Elliott Avenue and Lynch Road, Detroit. Here the DeSoto six will be made. This plant is famous as having the longest single room in the world—2492 ft., or 148 ft. less than half a mile. The Chrysler people also are said to be considering the casting of cylinder blocks for at least one or two of their models in the Dodge foundry, which has been comparatively inactive for many months. Almost all of the cylinder blocks for Chrysler-made cars have been contracted for from outside sources.

ONE of the larger automobile companies is reported to be planning a change in the method of purchasing its bodies. For several years it has bought the steel to be used by the body makers, feeling that its enormous buying power gave it a price advantage as compared with the body people who might order the material direct from the mills. Now it is contemplating the abandonment of this policy, so that it can make a contract with body manufacturers to supply bodies at a set price per unit. The body companies, in turn, will be free to control their own materials by purchasing them as they see fit. It is said that the automobile maker is of the opinion that it can make a sub-

January figures may show output as high as 200,000 cars. February is likely to be 225,000, first quarter 700,000.

* * *

Chevrolet has 70,000 cars scheduled for February, 75,000 for March. Ford probably will make 75,000 in February.

* * *

Auburn and Peerless companies reduced inventories 45 per cent in 1930. This is thought to be representative of the industry.

* * *

December production officially announced as 161,000 cars, a gain of 28 per cent over December, 1929. Nineteen-thirty output was 3,509,062 cars, compared with 5,621,709 in 1929, 4,601,141 in 1928 and 3,580,380 in 1927.

stantial saving in body cost under the new arrangement. Body companies already have asked the steel mills for prices on materials, indicating that this innovation will at least be given a trial. Some of the steel people believe that the arrangement may be flexible, in that the body companies will purchase steel direct so long as they can get as good a price as the automobile manufacturer; when they are put in an unfavorable position, the placing of steel orders again will revert to the automobile company's purchasing department.

Bowing to the wishes of the National Automobile Chamber of Commerce, which recently advocated all companies announcing new models in the last two months of the year, Buick this year will abandon its policy of bringing out its new line on Aug.

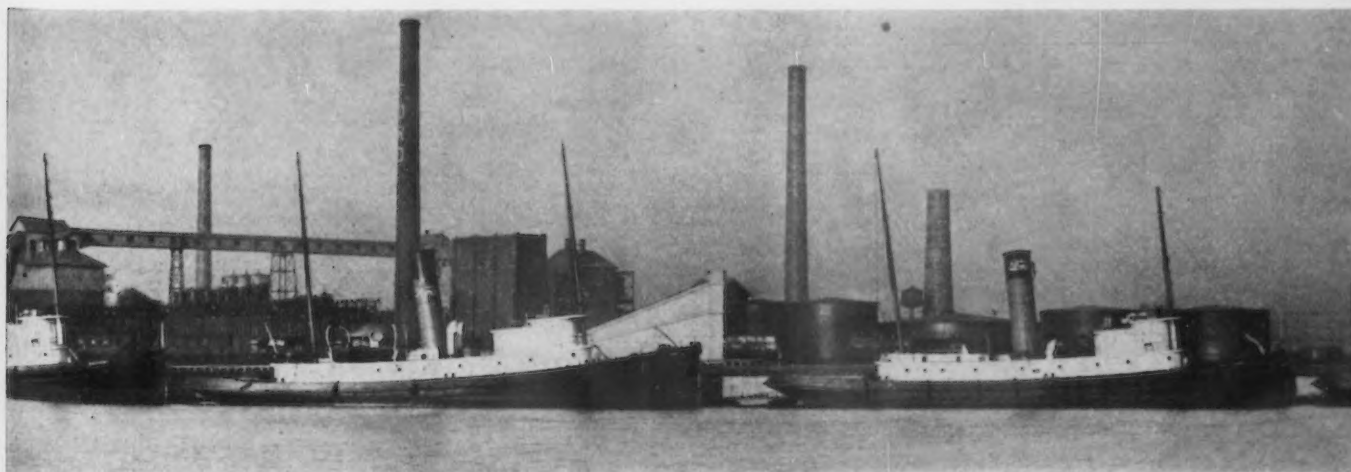
1 and will wait until the tail-end of 1931 to replace its present group of straight eights. E. T. Strong, Buick's president, made an announcement to this effect the past week. It is believed that other companies will follow suit. This means eventually that the annual automobile shows will be held in November or December rather than in January, although a change in date is not expected for the 1932 show.

Ford Adds to Ore Reserves

FORD has added to its reserves 1300 acres of low-grade ore properties in Dickinson County, Michigan. This comprises half of the old Millie mine in Iron Mountain, ownership of which is now divided between Ford and United States Steel Corp'n. It is thought that Ford has been endeavoring to purchase the latter's interest in the mine. Ford is now operating the Blueberry mine, located 65 miles northeast of Iron Mountain, and the Imperial mine, 80 miles north of Iron Mountain. Experiments now being conducted in the reduction of low-grade ores may increase considerably the value to the Ford company of its new properties. Contrary to the belief in certain circles, Ford does not secure sufficient ore from its own mines to supply its blast furnaces at Dearborn. While no figures are available, it is believed that outside purchases may run as high as 75 per cent of the total requirements.

The conservative policy adhered to by automobile manufacturers in the past year is exemplified by the record of General Motors, which sold 22,050 more cars to consumers than to dealers in 1930. Sales to consumers amounted to 1,057,710 units. Without exception, manufacturers are expected to continue holding production to retail demand during the coming year.

William Powell Co., Cincinnati, manufacturer of valves and other engineering appliances, has opened an engineering and export department at 50 Church Street, New York.



showing the plant of the Ford Motor Co.

January Iron Output Up 3 Per Cent With a Net Gain of 7 Furnaces

FOR the first time since last April, there was an increase last month in the daily rate of pig iron production. Data, gathered largely by wire on Feb. 3, from every operating furnace, show an increase of about 3 per cent for January over December. There was also a gain in active furnaces.

The daily output for January was 55,299 gross tons, which is 1567 tons, or 3 per cent, larger than the 53,732 tons per day in December. There was a net gain of seven furnaces, contrasting with a net loss of 12 fur-

naces in December. This is the first net gain since March, 1930.

Coke pig iron production in January was 1,714,266 gross tons, or 55,299 tons per day for the 31 days. This compares with 1,665,690 tons, or 53,732 tons per day for the 31 days in December. The gain in daily rate was 1567 tons, or about 3 per cent. There was a loss in December from November of 13.7 per cent. In November the loss was 10.9 per cent, with 8 per cent in October, 6.8 per cent in September and 4.3 per cent in August.

The January daily rate is the small-

est for that month since January, 1922. It is interesting to note that for every January since 1922 and up to January, 1931, the daily rate has exceeded 90,000 tons.

Net Gain of 7 Furnaces

There were 13 furnaces blown in during January and six blown out or banked. In December 14 stacks were blown out and only two blown in.

Operating Rate on Feb. 1

On Feb. 1 the estimated operating rate for the 107 furnaces active was

Daily Average Production of Coke Pig Iron in the United States
by Months Since Jan. 1, 1927—Gross Tons

	1927	1928	1929	1930	1931
Jan.	100,123	92,573	111,044	91,209	55,299
Feb.	105,024	100,004	114,507	101,390	.....
Mar.	112,366	103,215	119,822	104,715	.....
Apr.	114,074	106,183	122,087	106,062	.....
May	109,385	105,931	125,745	104,283	.....
June	102,988	102,733	123,908	97,804	.....
½ year...	107,351	101,763	119,564	100,891	.....
July	95,199	99,091	122,100	85,146	.....
Aug.	95,073	101,180	121,151	81,417	.....
Sept.	92,498	102,077	116,585	75,890	.....
Oct.	89,810	108,832	115,745	69,831	.....
Nov.	88,279	110,084	106,047	62,237	.....
Dec.	86,960	108,705	91,513	53,732	.....
Year ...	99,266	103,382	115,851	86,025	.....

Pig Iron Production by Districts, Gross Tons

	Jan. (31 days)	Dec. (31 days)	Nov. (30 days)	Oct. (31 days)
New York and Mass....	99,352	93,448	118,947	128,710
Lehigh Valley	41,033	45,411	52,344	72,938
Schuylkill Valley	25,509	27,703	25,790	25,340
Lower Susq. and Leba- non Valley	18,974	18,375	16,570	18,012
Pittsburgh district	357,128	346,877	425,446	530,689
Shenango Valley	38,929	47,096	50,909	54,750
Western Pennsylvania ..	40,988	28,656	50,866	53,952
Maryland, Va. and Ky..	82,436	60,803	69,728	83,621
Wheeling district	102,320	111,609	106,782	128,486
Mahoning Valley	75,339	67,131	118,572	167,775
Central and North'n Ohio	184,519	169,575	172,729	198,479
Southern Ohio	26,160	26,139	26,807	33,251
Illinois and Indiana....	384,453	386,963	395,814	424,329
Mich., Minn., Mo., Wis., Colo. and Utah	85,186	101,254	93,627	106,683
Alabama	150,251	134,650	142,186	147,753
Tennessee	1,689	.....	.....	.....
Total	1,714,266	1,665,690	1,867,107	2,164,768

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works Iron	Merchant Iron*	Total
January, 1930	71,447	19,762	91,209
February	81,580	19,810	101,390
March	83,900	20,815	104,715
April	85,489	20,573	106,062
May	84,310	19,973	104,283
June	77,883	19,921	97,804
July	66,949	18,197	85,146
August	64,857	16,560	81,417
September	62,342	13,548	75,890
October	57,788	12,043	69,831
November	49,730	12,507	62,237
December	40,952	12,780	53,732
January, 1931	45,883	9,416	55,299

*Includes pig iron made for the market by steel companies.

Coke Furnaces in Blast

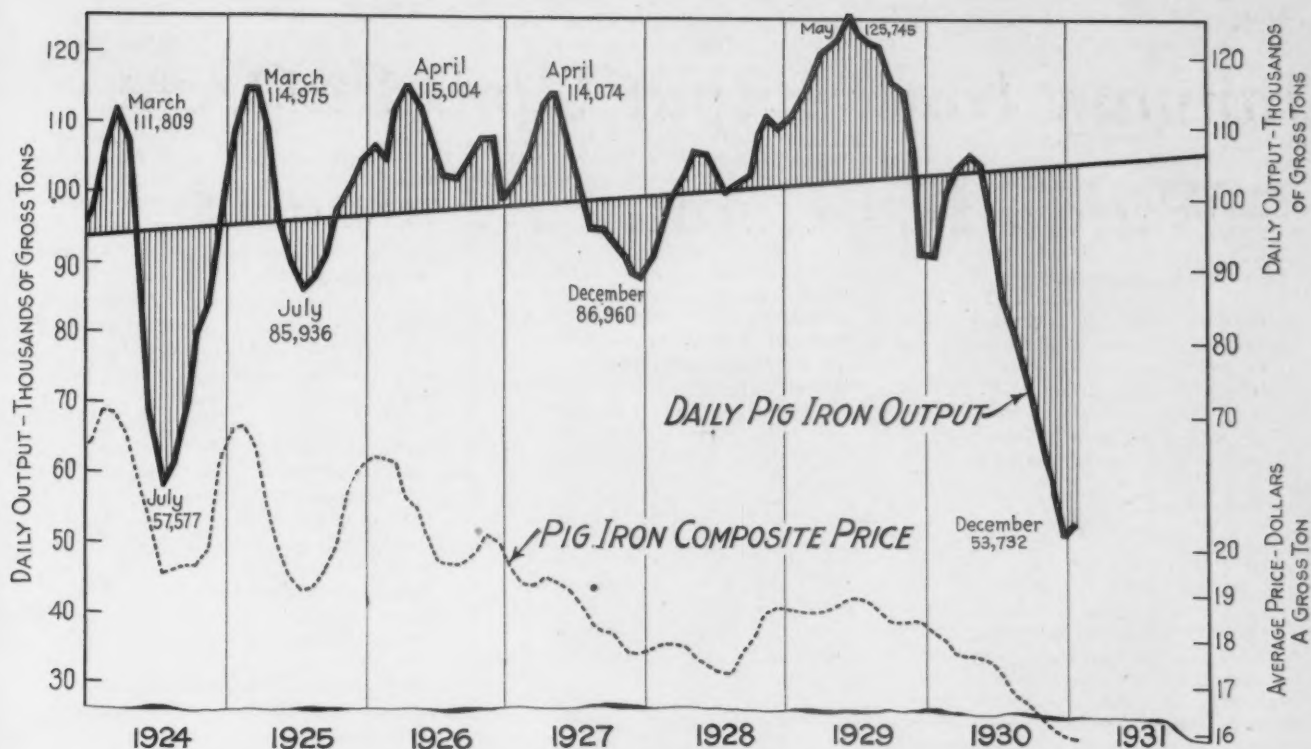
	Feb. 1		Jan. 1	
Furnaces	Number in Blast	Rate of Operation	Number in Blast	Rate of Operation
New York:				
Buffalo	4	2,545	4	2,375
Other N. Y. and Mass.	2	660	2	540
New Jersey	0	.....	0	.....
Pennsylvania:				
Lehigh Valley	4	1,325*	4	1,465*
Schuylkill Valley	2	820	2	900
Susquehanna Valley ..	1	610	1	600
Ferromanganese	0	.....	0	.....
Lebanon Valley	0	.....	0	.....
Ferromanganese	0	.....	0	.....
Pittsburgh District ..	18	11,495	19	10,500
Ferromanganese	2	315	2	300
Shenango Valley	2	1,255	2	1,155
Western Pennsylvania	2	1,280	3	1,575
Ferromanganese	1	200	0	.....
Maryland	3	2,135	2	1,420
Wheeling District	4	3,150	5	3,600
Ohio:				
Mahoning Valley	6	3,600	3	1,525
Central and Northern	10	6,145	9	5,470
Southern	3	845	3	845
Illinois and Indiana....	19	12,900	17	11,620
Mich., Wis. and Minn...	3	1,470	4	1,855
Colo., Mo. and Utah....	3	1,195	3	1,090
The South:				
Virginia	0	.....	0	.....
Ferromanganese	1	100	1	100
Kentucky	1	420	1	375
Alabama	10	4,845	8	4,020
Ferromanganese	0	.....	0	.....
Tennessee	1	55	0	.....
Total	102	57,365	95	51,330

*Includes spiegeleisen.

Production of Coke Pig Iron in United States by Months
Beginning Jan. 1, 1929—Gross Tons

	1929	1930	1931
Jan.	3,444,370	2,827,464	1,714,266
Feb.	3,206,185	2,838,920	.....
Mar.	3,714,473	3,246,171	.....
Apr.	3,662,625	3,181,868	.....
May	3,898,082	3,232,760	.....
June	3,717,225	2,934,129	.....
½ year.....	21,640,960	18,261,312	.....
July	3,785,120	2,639,537	.....
Aug.	3,755,680	2,523,921	.....
Sept.	3,497,564	2,276,770	.....
Oct.	3,588,118	2,164,768	.....
Nov.	3,181,411	1,867,107	.....
Dec.	2,836,916	1,665,690	.....
Year*	42,285,769	31,399,105	.....

*These totals do not include charcoal pig iron. The 1929 production of this iron was 138,193 gross tons.



Daily production of pig iron is still somewhat further below needs than in 1924

Inclined line represents the gradually increasing theoretical needs of the country, ascertained by a balancing of the ups and downs in production. It shows an average yearly increase in consumption of about 575,000 tons. Inclusion of 1930 in calculating the trend line has lowered it from that previously shown.

57,365 tons per day, as compared with 51,330 tons per day for the 95 furnaces blowing on Jan. 1.

Of the 13 furnaces blown in last month, eight were independent steel company stacks, three belonged to the Steel Corporation and two were merchant furnaces. Three Steel Corporation and two independent steel company furnaces were blown out besides one merchant stack.

Furnace Changes in January

Furnaces blown in during January were the following: One Susquehanna furnace of the Hanna Furnace Corp.

in the Buffalo district; one Monessen furnace of the Pittsburgh Steel Co. in the Pittsburgh district; one furnace at the Sparrows Point plant of the Bethlehem Steel Corp. in Maryland; two Campbell furnaces and one Hubbard furnace of the Youngstown Sheet & Tube Co. and the Trumbull-Cliffs furnace of the Republic Steel Corp. in the Mahoning Valley; the United furnace of the Republic Steel Corp. in northern Ohio; one South Chicago furnace of the Illinois Steel Co. and one furnace of the Wisconsin Steel Co. in the Chicago district; two Bessemer furnaces of the Tennessee Coal,

Iron & Railroad Co. in Alabama and the Rockdale furnace of the Tennessee Products Corp. in Tennessee.

Furnaces blown out or banked during January were the following: One Susquehanna furnace of the Hanna Furnace Corp. in the Buffalo district; one Carrie furnace of the Carnegie Steel Co. and one Donora furnace of the American Steel & Wire Co. in the Pittsburgh district; one Ohio furnace of the Carnegie Steel Co. in the Mahoning Valley; the Riverside furnace of the Wheeling Steel Corp. in the Wheeling district, and one furnace of the Minnesota Steel Co. in Minnesota.

Possibly Active Furnaces Reduced

The total number of possibly active stacks in the United States is reduced from 312 to 310 by the dismantling of the "B" furnace at the Cambria plant of the Bethlehem Steel Corp. and the Crane furnace of the Crane Iron Works in the Lehigh Valley.

Production of Steel Companies for Own Use—Gross Tons

	Total Pig Iron			Ferromanganese*		
	Spiegel and Ferromanganese					
	1929	1930	1931	1929	1930	1931
Jan.	2,651,416	2,214,875	1,422,382	28,208	27,260	14,251
Feb.	2,498,901	2,284,234	.....	25,978	21,310	.....
Mar.	2,959,295	2,600,980	.....	24,978	23,345	.....
Apr.	2,826,028	2,564,681	.....	22,413	27,777	.....
May	3,105,404	2,613,628	.....	25,896	30,296	.....
June	2,999,798	2,304,223	.....	33,363	27,327	.....
½ year	17,040,842	14,582,621	.....	160,836	157,325	.....
July	3,039,370	2,075,414	.....	31,040	17,728	.....
Aug.	3,065,874	2,010,572	.....	28,461	20,909	.....
Sept.	2,862,799	1,870,269	.....	27,505	21,181	.....
Oct.	2,902,960	1,791,421	.....	31,108	24,480	.....
Nov.	2,498,291	1,491,927	.....	31,866	18,619	.....
Dec.	2,112,704	1,269,529	.....	28,564	16,288	.....
Year	33,522,840	25,101,753	.....	339,380	276,530	.....

*Includes output of merchant furnaces.

Foundry Equipment Manufacturers Association reports foundry equipment orders for December at an index figure of 59.76, the figure 100 representing average monthly shipments for 1922, 1923 and 1924. The December figure was the best since September, when orders stood at 91, figures for October and November having been 50 and 45.3 respectively.

Many Technical Papers for Western Congress

Technical papers which are to be presented at the Western Metal Congress at San Francisco, Feb. 16 to 20, sponsored by the American Society for Steel Treating, are as follows:

Morning Session, Feb. 16—American Institute of Mining and Metallurgical Engineers.

"Improvements in the Physical Properties of Large Carbon and Alloy Steel Castings," by J. Fenstermacher, Columbia Division United States Steel Corp.

"Manganese Steels," by D. H. Young, American Manganese Steel Co.

"The Formation and Elimination of Non-Metallic Inclusions in the Acid Open-Hearth Furnace," by C. H. Herty, Jr., United States Bureau of Mines, and J. E. Jacobs, Heppenstall Co., Pittsburgh.

"High-Test Cast Iron," by F. B. Coyle, International Nickel Co.

Afternoon Session, Feb. 16—American Society for Testing Materials.

"Failure of Machine Parts," by L. T. Holt, consulting physical metallurgist, Seattle.

"Metallurgy of Welding," by Paul Jeffers, structural engineer, Los Angeles.

"High Strength Steel for a High Pressure Hydraulic Jack," by G. H. Bragg, Pacific Gas & Electric Co.

Morning Session, Feb. 17—Society of Automotive Engineers.

"Automotive Steels," by J. M. Watson, Hupp Motor Car Co., Detroit.

"Automobile Wheels," by A. B. Dornoske, Stanford University.

"Steel Personality," by B. F. Shepherd, Ingersoll Rand Co.

Afternoon Session, Feb. 17—American Welding Society.

"Recent Developments in Welded-On Overlays," by Miles C. Smith, Stooddy Corp., Whittier, Cal.

"Welding Aluminum and Its Alloys," by W. H. Dunlap, Aluminum Co. of America.

"Shape Cut Steel," by C. E. Rhein, Linde Air Products Co.

Morning Session, Feb. 18—American Welding Society.

"Structural Arc Welding—A Review of What Has Been Accomplished and Its Future," by A. F. Davis, Lincoln Electric Co.

"Coated Electrodes," by Mr. Stroebel, Stooddy Corporation.

"Fusion Welding," by J. C. Hodge, Babcock & Wilcox Co.

Afternoon Session, Feb. 18—Society Automotive Engineers.

"Aluminum Alloys," by W. M. Holshauer, Aluminum Co. of America, Oakland.

"Magnesium Alloys," by Dr. W. A. Gann, Dow Chemical Co., Midland, Mich.

Morning Session, Feb. 19—Pacific Coast Gas Association.

"Gas Furnace for Nitriding," by J. H. Knapp, J. H. Knapp Co., Los Angeles.

"Carburizing Steel by Gas," by R. G. Guthrie, Peoples Gas Light & Coke Co., Chicago.

"Progress and Development of Fuel-Fired Furnaces," by E. G. de Coriolis, Surface Combustion Co.

"Manufacture and Properties of Seamless Steel Pipe," by G. P. McNiff, National Tube Co.

Afternoon Session, Feb. 19—American Society of Mechanical Engineers.

"Nitriding," by O. E. Harder, Battelle Memorial Institute.

"Creep of Metals at High Temperatures," by P. T. McVetty, Westinghouse Electric & Mfg. Co.

"Machinability of Metals," by A. H. d'Archambal, Pratt & Whitney Co.

"Seamless Rolled Cylinders," by H. L. M. Whitney, M. W. Kellogg Co.

Morning Session, Feb. 20—American Chemical Society.

"Recent Developments in Corrosion Prevention of Ferrous Metals," by F. N. Speller and V. V. Kendall, National Tube Co., Pittsburgh.

"Chromium and Chromium-Nickel Steels," by M. J. R. Morris, Republic Steel Corp.

"Corrosion and Lubrication of Valves," by George F. Scherer, Merco-Nordstrom Valve Co.

Afternoon Session, Feb. 20—American Institute of Electrical Engineers and Pacific Coast Electrical Association.

"Electricity in the Steel Mill," by G. E. Stolz, Westinghouse Electric & Mfg. Co.

"The Use of Electricity in the Heat Treatment of Steels," by George W. Bernhard, Pacific Gas & Electric Co.

Symposium on Welding by A.S.T.M. in March

Arrangements have been made by the American Society for Testing Materials to hold a regional meeting in Pittsburgh on Wednesday, March 18. This is the second meeting of the kind, the first having been in Detroit a year ago. A symposium on welding has been arranged as the technical feature of the meeting. The following tentative program has been prepared for the morning and afternoon sessions:

Morning Session

"Historical Introduction and General Survey," by F. T. Llewellyn, technical advisor to the president, United States Steel Corp.

"The Quality of Materials for Welding," by F. N. Speller and C. R. Textor, National Tube Co.

"Technical Examples of Modern Welding Practice," by A. M. Candy, general engineer, Westinghouse Electric & Mfg. Co.

Afternoon Session

The Inspection and Testing of Welded Products.

(a) Fatigue and Impact Tests for Welded Connections.

(b) X-ray Testing.

(c) Magnetic Testing.

(d) Stethoscopic Examination of Welded Products.

(e) Practical Inspection of Finished Welded Products.

The paper by A. M. Candy is a contribution from the American Welding Society, the Pittsburgh section of which is in charge of this symposium, and the paper by F. N. Speller and C. R. Textor is sponsored by subcommittee XXI on steel for welding, and the American Society for Testing Materials' committee A-1 on steel. The regional meeting will close with an informal dinner in the evening.

New England Council Takes Steps to Aid Employment

Measures regarded as most helpful toward increasing and maintaining employment in New England are presented in the report of a referendum conducted among New England manufacturers and other business interests by the industrial committee of the New England Council, Statler Building, Boston.

The committee recently placed before New England business men a list of measures calculated to promote employment maintenance and asked them to vote for those which they considered most effective and important. Of nearly 1000 individuals who replied, more than 60 per cent were manufacturers.

More than 70 per cent of those replying declared that the first essential is to hold actual layoffs to a minimum and substitute the elimination of overtime and the reduction of weekly hours. New England industry, it appears, is following this policy to an unprecedented degree at present, according to the council's industrial committee.

Next in order of emphasis is the recommendation to New England firms to merchandise aggressively by developing new products to meet new or changing needs; by finding new uses for present products; by improving quality and packaging, or presenting the product more attractively; by eliminating slow-selling lines, unprofitable accounts and territories, and by advertising consistently.

The third important step advocated by the consensus of replies calls upon New England employers to maintain employee morale by providing wages and working conditions on levels enabling their employees to prosper as well in New England as they might elsewhere, and to keep them informed on the employer's efforts to maintain steady work.

The fourth measure urged is that people with stable incomes buy for their normal needs.

Fifth in the order of importance established by the referendum is general industrial house-cleaning, including painting, overhauling and repairing. Two hundred manufacturers agreed upon this as an effective way to prepare for cheaper production and the increased demand of the future.

Research to find out what new products or changes in present ones consumers desire, to find ways to improve products or reduce cost without sacrifice of quality or service, constitutes the seventh recommendation.

To Manufacture Mill Rolls

The Ohio Steel Foundry Co., Lima, Ohio, has added to its activities the manufacture of carbon steel, alloy steel and electric steel mill rolls. The company has spent some time in research and preparation for the manufacture of rolls.

Steel Founders Seeking Better Technical and Sales Practices

MUCH constructive work beneficial to the steel foundry industry was done in 1930 by the Steel Founders' Society of America. This was brought out, in reports of officers and committees, at the annual meeting at the Hollenden Hotel, Cleveland, Jan. 29. Various activities of the society were outlined in an address by the president, John E. McCauley, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. Owing to Mr. McCauley's absence because of illness, John E. Galvin, Ohio Steel Foundry Co., vice-president of the Central-Atlantic division, presided.

Pointing out that the society has passed through a year of difficulty and depression, the president urged the members to throw off the cloak of pessimism which has pervaded the industry and to carry on their activities with optimism and with a will to accomplish things. Reviewing the activities of the society during the year, Mr. McCauley stated that valuable data had been gathered, analyzed and distributed to the members. Thirty new members were added since the reorganization, making the present membership 78.

Whole-hearted confidence in its officers, as well as sincere and enthusiastic support, was urged. Membership should be increased to represent at least 80 per cent of the country's capacity, and the society should have a prestige that would constitute a guiding influence in the industry. Members also were urged to cooperate heartily and to offer constructive criticism.

Condemns Selling Below Cost

The worst evil in the industry, in the president's opinion, has been the tendency of some manufacturers to sell castings at less than cost. Another evil is the refusal of some foundries to confine their sales efforts to their own geographical territories. These two evils, probably more than any others, added to confusion in the industry. He believes that the adoption of a uniform cost system will help to eliminate these evils. "If we are going to maintain our position in industry," declared Mr. McCauley, "it is important that we make sufficient profit so that we can replace our antiquated machinery with modern labor-saving devices, and thereby reduce our costs and improve our quality."

One important development of the year has been the establishment of a research department whose first work



W. H. Worrilow

will be to investigate the field of new uses for steel castings. With industry as a whole operating at only 60 per cent, the president said, it is not difficult to understand the necessity of such a step. Steel foundrymen have too long ignored the encroachments being made on their tonnage by other products.

Asks Support from 125 Foundries

To assure carrying out the society's five-year program of activities, Granville P. Rogers, managing director, in a comprehensive report, said that, while the increase in membership is encouraging, the society should have the active support of at least 125 foundries. The report reviewed the various activities of the organization during the year. A uniform cost system was adopted which is now the recognized standard for the industry. The foundries were urged to study and install the system and then be guided by it, rather than by reports of salesmen as to how other foundries are pricing their products.

A code of standard trade customs to govern the purchase and sale of steel castings has been created. Many buyers of castings have subscribed to the code and a growing number of steel foundries have adopted it. The society has challenged many misleading statements detrimental to cast steel, and has defended the product and the industry from unwarranted and unethical attacks, mostly from individuals interested in promoting

competitive products. The society was urged to bring before engineers, designers, buyers, technical schools and the public the advance made by the industry in recent years.

Industry Has Too Much Capacity

Referring to the excess capacity of the steel foundry industry, Mr. Rogers said that the idle and excess capacity in 1929, which was one of the biggest years in the industry, was 772,000 net tons. This excess capacity exceeded the total tonnage produced that year by all the electric, converter and crucible steel foundries. Operations during that year were sufficient to fill the foundries to only about two-thirds of their rated capacity. In the face of this situation the building of 20 new foundries was contemplated during the year, but after facts were presented as to present over-capacity nearly every project was abandoned.

Referring to the discouraging profit records of many basic industries, Mr. Rogers called attention to President Hoover's recommendation that a study be made of the anti-trust laws, which matter has been referred to the Senate Judiciary Committee. Mr. Rogers' recommendation was adopted that a committee be appointed to draft a letter to Sen. George W. Norris, chairman of that committee, endorsing a survey to determine the causes of lack of profits, and to develop remedies for relief.

Cooperation in Meeting Problems Reported

Constructive meetings of Eastern steel foundrymen were held during the year. This was brought out in an address by W. H. Worrilow, Lebanon Steel Foundry Co., Lebanon, Pa., vice-president, and chairman of the Eastern division. A local committee known as "New Uses Committee" was appointed, consisting of two open-hearth and four electric furnace men. Four meetings were held at different places in the vicinity of Philadelphia. These meetings developed suggestions for several new uses for castings and frank discussion of what the different foundries were doing.

Frequently it was found that one foundry had had considerable experience with the production of an article similar to that with which another foundry was struggling. Through a friendly interchange of ideas and discussion of common business problems there developed a re-

February Motor Car Output Now Placed at Minimum of 225,000

DETROIT, Feb. 2.

REVISED estimates of automobile production in the United States and Canada last month put the total at 175,000 to 200,000 cars, with a fair chance that official figures may reach the latter mark. The showing depends on Ford output, which will not be known for perhaps another week. There is a tendency on the part of observers to place February's performance on a higher plane than previously had been thought possible, with car assemblies ranging from 225,000 to 250,000 units.

It is now considered likely that in the first quarter the industry will manufacture the 700,000 to 750,000 cars which were predicted at the beginning of the year. Although the current rate is considerably under that in the corresponding period of 1930 and probably will lag behind last year during the entire first quarter, this fact already has been discounted. The encouraging thing is that indications point to slow but consistent gains up to the middle of the year, with the likelihood that production will still be on the upgrade at a time when it usually is falling off.

Official Government figures reveal that December output was 161,000 cars, or slightly better than had been estimated by the National Automobile Chamber of Commerce. This made the total for 1930 3,509,062 cars, compared with 5,621,709 cars in 1929, 4,601,141 in 1928 and 3,580,380 in 1927. It proved to be the poorest showing

since 1922, when 2,646,229 cars were made.

Steel Orders Have Gained

THE betterment in the automobile industry is reflected in the steel tonnage shipped by mills during January. One large maker of light-rolled products reports a gain of 5 per cent over December, another company's tonnage last month was double that of the previous month. Much of the increase was in the last 10 days of January. The support came from practically all automobile manufacturers, but the bulk of the business was from Chevrolet and Ford.

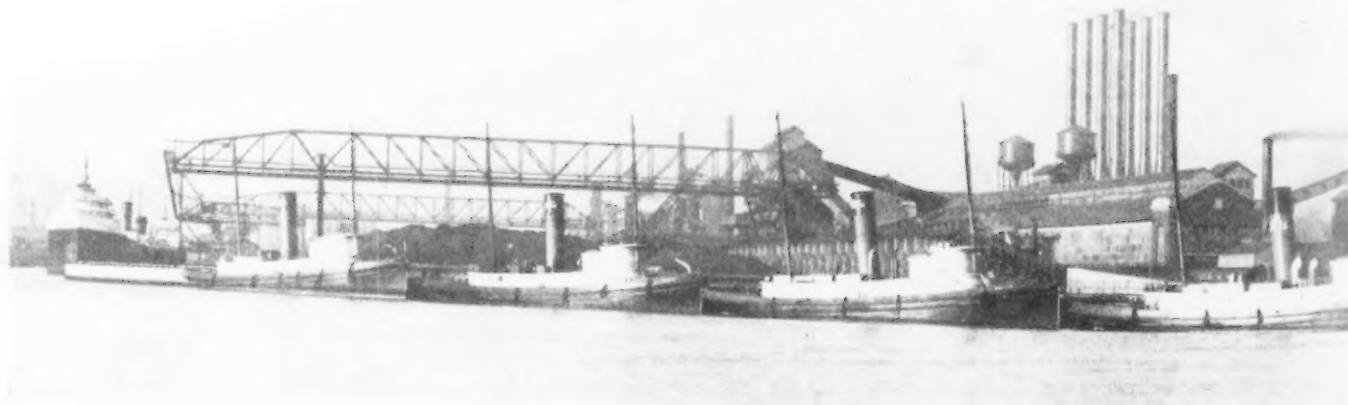
Chevrolet accounted for about 70,000 cars in January and its February schedule calls for a like number. It is said that March may see some further expansion to 75,000 to 80,000 cars. Despite the high current rate of production, Chevrolet dealers are understood to have only about six or seven cars each. Ford's January operations probably were near the 70,000 mark, with 75,000 assemblies set for this month. Auburn has surprised with a February program of 4000 cars at its Connersville and Auburn plants; it now is preparing facilities for manufacturing an additional 2000 cars monthly at Auburn, where the changeover will be completed in time to start operations by March 15. This will be in addition to the present daily capacity of 50 Cord front-drive cars and 85 Auburns. Dodge has taken on 1600 men since Christmas and now has

a working force of 10,231 men. Buick is turning out 500 cars a day, four days a week, and Studebaker 300 cars daily. Cadillac has been making 1000 cars a day, Packard 800. Oakland, Pontiac and Oldsmobile have moderate schedules. Most of the Chrysler subsidiaries are operating only fair at best, while Hupp's production still remains low.

Inventories Reduced 45 Per Cent

ONE of the economies introduced by practically all automobile makers the past year was a drastic reduction in inventories. Stocks were cut down to almost unbelievable proportions, with scarcely a plant having enough on hand to run more than a few days. To cite two examples, the annual reports of the Auburn Automobile Co. and the Peerless Motor Car Corp. reveal that both slashed inventories 45 per cent during 1930. It is no exaggeration to say that this figure would be a fairly conservative estimate for the industry as a whole.

On the other hand, there are signs that buyers are getting somewhat away from the ultra-conservative spirit which has ruled in recent months. Their trend of thought is indicated by a statement by W. S. Knudsen, president, Chevrolet Motor Co.: "With commodity prices at rock bottom, progressive manufacturers have begun buying in larger volume at the favorable prevailing prices. Where commitments for raw materials were generally made on a 30, 60 or 90-day



A view of the river front at River Rouge, Mich.

basis, they are now commonly being made on much longer terms at advantageous prices so that the savings thus effected might be passed on in terms of lower-priced products. These long-term commitments work to the advantage of the supplier as well as the consumer, for they mean constant and steady operation of his plants and work for his employees."

DeSoto to Be Made in Plymouth Plant

IN line with its decision to remove production activities from its Highland Park plant, which will be devoted to service and parts departments, Chrysler Corp. has transferred the general offices and a portion of the manufacturing department of its DeSoto subsidiary to the Plymouth plant at Mount Elliott Avenue and Lynch Road, Detroit. Here the DeSoto six will be made. This plant is famous as having the longest single room in the world—2492 ft., or 148 ft. less than half a mile. The Chrysler people also are said to be considering the casting of cylinder blocks for at least one or two of their models in the Dodge foundry, which has been comparatively inactive for many months. Almost all of the cylinder blocks for Chrysler-made cars have been contracted for from outside sources.

ONE of the larger automobile companies is reported to be planning a change in the method of purchasing its bodies. For several years it has bought the steel to be used by the body makers, feeling that its enormous buying power gave it a price advantage as compared with the body people who might order the material direct from the mills. Now it is contemplating the abandonment of this policy, so that it can make a contract with body manufacturers to supply bodies at a set price per unit. The body companies, in turn, will be free to control their own materials by purchasing them as they see fit. It is said that the automobile maker is of the opinion that it can make a sub-

January figures may show output as high as 200,000 cars. February is likely to be 225,000, first quarter 700,000.

* * *

Chevrolet has 70,000 cars scheduled for February, 75,000 for March. Ford probably will make 75,000 in February.

* * *

Auburn and Peerless companies reduced inventories 45 per cent in 1930. This is thought to be representative of the industry.

* * *

December production officially announced as 161,000 cars, a gain of 28 per cent over December, 1929. Nineteen-thirty output was 3,509,062 cars, compared with 5,621,709 in 1929, 4,601,141 in 1928 and 3,580,380 in 1927.

stantial saving in body cost under the new arrangement. Body companies already have asked the steel mills for prices on materials, indicating that this innovation will at least be given a trial. Some of the steel people believe that the arrangement may be flexible, in that the body companies will purchase steel direct so long as they can get as good a price as the automobile manufacturer; when they are put in an unfavorable position, the placing of steel orders again will revert to the automobile company's purchasing department.

Bowing to the wishes of the National Automobile Chamber of Commerce, which recently advocated all companies announcing new models in the last two months of the year, Buick this year will abandon its policy of bringing out its new line on Aug.

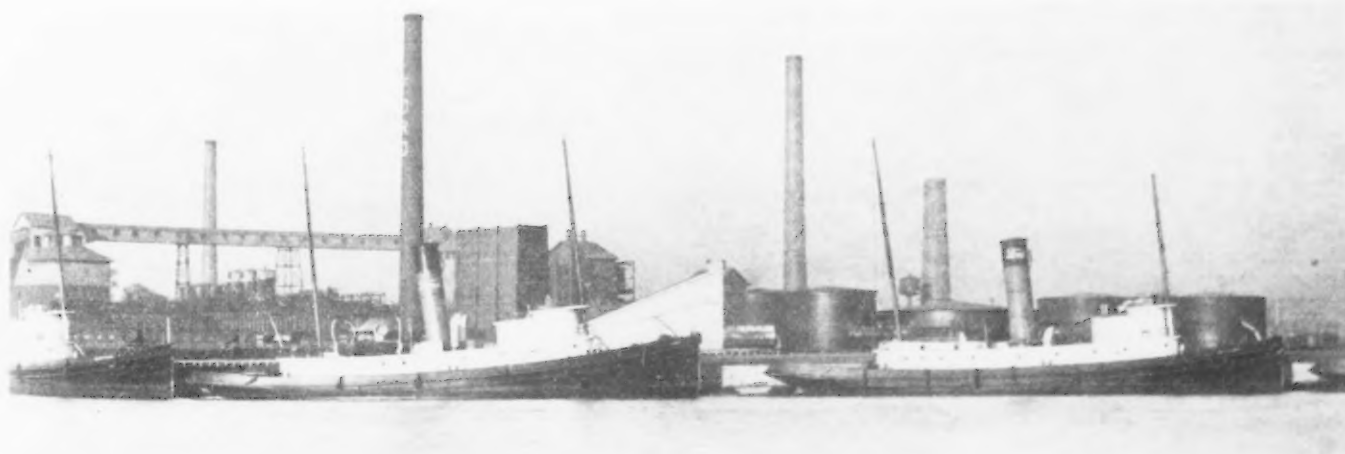
1 and will wait until the tail-end of 1931 to replace its present group of straight eights. E. T. Strong, Buick's president, made an announcement to this effect the past week. It is believed that other companies will follow suit. This means eventually that the annual automobile shows will be held in November or December rather than in January, although a change in date is not expected for the 1932 show.

Ford Adds to Ore Reserves

FORD has added to its reserves 1300 acres of low-grade ore properties in Dickinson County, Michigan. This comprises half of the old Millie mine in Iron Mountain, ownership of which is now divided between Ford and United States Steel Corp. It is thought that Ford has been endeavoring to purchase the latter's interest in the mine. Ford is now operating the Blueberry mine, located 65 miles northeast of Iron Mountain, and the Imperial mine, 80 miles north of Iron Mountain. Experiments now being conducted in the reduction of low-grade ores may increase considerably the value to the Ford company of its new properties. Contrary to the belief in certain circles, Ford does not secure sufficient ore from its own mines to supply its blast furnaces at Dearborn. While no figures are available, it is believed that outside purchases may run as high as 75 per cent of the total requirements.

The conservative policy adhered to by automobile manufacturers in the past year is exemplified by the record of General Motors, which sold 22,050 more cars to consumers than to dealers in 1930. Sales to consumers amounted to 1,957,710 units. Without exception, manufacturers are expected to continue holding production to retail demand during the coming year.

William Powell Co., Cincinnati, manufacturer of valves and other engineering appliances, has opened an engineering and export department at 50 Church Street, New York.



showing the plant of the Ford Motor Co.

January Iron Output Up 3 Per Cent With a Net Gain of 7 Furnaces

FOR the first time since last April, there was an increase last month in the daily rate of pig iron production. Data, gathered largely by wire on Feb. 3, from every operating furnace, show an increase of about 3 per cent for January over December. There was also a gain in active furnaces.

The daily output for January was 55,299 gross tons, which is 1567 tons, or 3 per cent, larger than the 53,732 tons per day in December. There was a net gain of seven furnaces, contrasting with a net loss of 12 fur-

naces in December. This is the first net gain since March, 1930.

Coke pig iron production in January was 1,714,266 gross tons, or 55,299 tons per day for the 31 days. This compares with 1,665,690 tons, or 53,732 tons per day for the 31 days in December. The gain in daily rate was 1567 tons, or about 3 per cent. There was a loss in December from November of 13.7 per cent. In November the loss was 10.9 per cent, with 8 per cent in October, 6.8 per cent in September and 4.3 per cent in August.

The January daily rate is the small-

est for that month since January, 1922. It is interesting to note that for every January since 1922 and up to January, 1931, the daily rate has exceeded 90,000 tons.

Net Gain of 7 Furnaces

There were 13 furnaces blown in during January and six blown out or banked. In December 14 stacks were blown out and only two blown in.

Operating Rate on Feb. 1

On Feb. 1 the estimated operating rate for the 107 furnaces active was

Iron and Steel Production of Coke-Pig Iron in the United States—
Six Months' Work, Jan. 1, 1927—Gross Tons

	1927	1928	1929	1930	1931
Jan.	169,129	169,275	111,944	91,269	55,299
Feb.	165,924	169,694	114,567	101,599	101,599
Mar.	112,399	107,212	119,822	104,715	106,062
Apr.	114,674	106,187	122,087	106,062	104,283
May	109,582	105,931	125,745	104,283	97,894
June	102,983	102,732	125,908	97,894	100,891
7 mos.	107,331	101,763	119,561	100,891	85,146
July	85,199	90,001	122,100	85,146	81,417
Aug.	85,072	101,749	121,451	81,417	75,890
Sept.	87,198	102,077	116,585	75,890	69,831
Oct.	84,810	108,832	115,745	69,831	62,237
Nov.	83,278	110,084	106,047	62,237	55,732
Dec.	83,360	108,705	91,513	55,732	55,732
Year	1,020,000	1,023,282	1,135,851	88,025	88,025

Iron and Steel Production in Districts, Gross Tons

	Jan.	Dec.	Nov.	Oct.
1931 (131 days) (131 days) (130 days) (131 days)	131,000	131,000	130,000	131,000
New York and Mass.	69,332	63,448	118,947	128,710
Lehigh Valley	11,033	45,411	52,344	72,938
Schenectady Valley	25,209	27,702	29,709	25,540
Lower Susquehanna and Lehigh Valley	18,974	18,375	16,570	18,012
Pittsburgh district	337,128	340,877	425,416	559,689
Shenandoah Valley	28,929	47,096	50,909	54,754
Western Pennsylvania	10,988	28,636	30,856	33,952
Maryland, Va. and Ky.	82,436	60,802	69,728	85,621
Whiting district	102,329	111,609	106,782	128,486
Maconing Valley	75,379	67,121	118,572	157,713
Central and North Ohio	181,219	169,575	172,723	198,478
Southern Ohio	26,160	26,109	26,897	33,251
Illinois and Indiana	384,455	386,963	395,814	424,329
Mich., Minn., Mo., Wis., Colo. and Utah	87,186	101,254	90,697	106,683
Alabama	150,251	124,630	112,186	147,753
Tennessee	1,689	1,689	1,689	1,689
Total	1,714,266	1,665,690	1,865,107	2,164,768

Daily Rate of Pig Iron Production by Month—Gross Tons

	Steel Works	Merchant Iron*	Total
January, 1930	51,447	19,762	91,209
February	81,580	19,810	101,390
March	82,900	20,815	103,715
April	85,489	20,579	106,062
May	84,310	19,572	103,882
June	77,889	19,921	97,810
July	66,949	18,197	85,146
August	61,857	16,566	78,423
September	62,342	12,548	74,890
October	57,788	12,642	70,430
November	49,720	12,507	62,227
December	40,952	12,780	53,732
January, 1931	45,882	9,416	55,299

*Includes pig iron made for the market by steel companies.

Coke Furnaces in Blast

	Feb. 1		Jan. 1	
Factories	Number in Blast	Rate of Operation	Number in Blast	Rate of Operation
New York				
Buffalo	4	2,345	4	2,375
Order N. Y. and Mass.	—	600	2	540
New Jersey	0	—	0	—
Pennsylvania				
Lehigh Valley	4	1,325*	4	1,465*
Schenectady Valley	2	820	2	900
Schenectady Valley	1	619	1	600
Perrinburg	0	—	0	—
Lebanon Valley	0	—	0	—
Perrinburg	0	—	0	—
Pittsburgh District	18	11,455	18	10,500
Perrinburg	2	315	2	300
Shenando Valley	2	1,255	2	1,155
Western Pennsylvania	2	1,280	3	1,375
Perrinburg	1	200	0	—
Maryland	0	—	0	—
Whiting District	4	3,159	5	3,600
Ohio				
Maconing Valley	6	3,600	3	1,525
Central and Northern	16	6,145	9	5,470
Southern	3	845	2	845
Illinois and Indiana	19	12,900	17	11,620
Mich., Wis. and Minn.	3	1,170	4	1,855
Colo., Mo. and Utah	3	1,195	3	1,000
The South				
Virginia	0	—	0	—
Perrinburg	1	100	1	100
Kentucky	1	420	1	375
Alabama	10	4,845	8	4,020
Perrinburg	0	—	0	—
Tennessee	1	35	0	—
Total	102	57,365	95	51,330

*Includes spiegelisen.

Production of Coke-Pig Iron in United States by Month—
Reaching Jan. 1, 1929—Gross Tons

	1929	1930	1931
Jan.	2,414,376	2,827,464	1,714,266
Feb.	2,206,185	2,838,920	1,714,266
Mar.	2,714,472	3,246,171	1,714,266
Apr.	3,662,625	3,181,868	1,714,266
May	3,898,082	3,232,760	1,714,266
June	3,717,225	2,934,129	1,714,266
7 mos.	21,640,960	18,261,312	1,714,266
July	2,785,120	2,639,537	1,714,266
Aug.	2,455,680	2,523,921	1,714,266
Sept.	3,497,564	2,276,770	1,714,266
Oct.	2,588,118	2,164,768	1,714,266
Nov.	2,181,411	1,867,107	1,714,266
Dec.	2,836,916	1,665,690	1,714,266
Year*	42,285,769	31,339,105	1,714,266

*These totals do not include charcoal pig iron. The 1929 production of this iron was 138,193 gross tons.



Daily production of pig iron is still somewhat further below needs than in 1924

Trend line represents the gradually increasing theoretical needs of the country, ascertained by a balancing of the ups and downs in production. It shows an average yearly increase in consumption of about 575,000 tons. Inclusion of 1930 in calculating the trend line has lowered it from that previously shown.

37,065 tons per day, as compared with 51,330 tons per day for the 95 furnaces blowing on Jan. 1.

Of the 13 furnaces blown in last month, eight were independent steel company stacks, three belonged to the Steel Corporation and two were merchant furnaces. Three Steel Corporation and two independent steel company furnaces were blown out besides one merchant stack.

Furnace Changes in January

Furnaces blown in during January were the following: One Susquehanna furnace of the Hanna Furnace Corp.

in the Buffalo district; one Monessen furnace of the Pittsburgh Steel Co. in the Pittsburgh district; one furnace at the Sparrows Point plant of the Bethlehem Steel Corp. in Maryland; two Campbell furnaces and one Hubbard furnace of the Youngstown Sheet & Tube Co. and the Trumbull-Cliffs furnace of the Republic Steel Corp. in the Mahoning Valley; the United furnace of the Republic Steel Corp. in northern Ohio; one South Chicago furnace of the Illinois Steel Co. and one furnace of the Wisconsin Steel Co. in the Chicago district; two Bessemer furnaces of the Tennessee Coal,

Iron & Railroad Co. in Alabama and the Rockdale furnace of the Tennessee Products Corp. in Tennessee.

Furnaces blown out or banked during January were the following: One Susquehanna furnace of the Hanna Furnace Corp. in the Buffalo district; one Carrie furnace of the Carnegie Steel Co. and one Donora furnace of the American Steel & Wire Co. in the Pittsburgh district; one Ohio furnace of the Carnegie Steel Co. in the Mahoning Valley; the Riverside furnace of the Wheeling Steel Corp. in the Wheeling district, and one furnace of the Minnesota Steel Co. in Minnesota.

Possibly Active Furnaces Reduced

The total number of possibly active stacks in the United States is reduced from 312 to 310 by the dismantling of the "B" furnace at the Cambria plant of the Bethlehem Steel Corp. and the Crane furnace of the Crane Iron Works in the Lehigh Valley.

Foundry Equipment Manufacturers Association reports foundry equipment orders for December at an index figure of 59.76, the figure 100 representing average monthly shipments for 1922, 1923 and 1924. The December figure was the best since September, when orders stood at 91, figures for October and November having been 59 and 45.3 respectively.

Production of Steel Components for Own Use—Gross Tons

	Total Pig Iron			Pig Iron Composite Price*		
	Spiegel and Ferrochrome			Pig Iron Composite Price*		
	1929	1930	1931	1929	1930	1931
Jan.	2,651,416	2,214,875	1,422,382	28,268	27,260	14,251
Feb.	2,498,801	2,284,224	1,422,382	25,978	21,310	14,251
Mar.	2,959,295	2,600,980	1,422,382	24,978	23,345	14,251
Apr.	2,826,028	2,564,681	1,422,382	22,413	27,777	14,251
May	3,195,404	2,613,628	1,422,382	25,896	30,296	14,251
June	2,999,798	2,304,224	1,422,382	35,263	27,327	14,251
12 months	17,010,842	14,582,621	8,222,382	166,836	157,325	82,223
July	2,639,379	2,075,414	1,422,382	31,040	17,728	14,251
Aug.	2,065,874	2,010,572	1,422,382	28,461	20,569	14,251
Sept.	2,862,799	1,870,289	1,422,382	27,595	21,181	14,251
Oct.	2,962,960	1,791,421	1,422,382	31,108	24,480	14,251
Nov.	2,498,291	1,491,927	1,422,382	31,866	18,619	14,251
Dec.	2,112,704	1,269,529	1,422,382	28,564	18,288	14,251
Year	33,522,840	25,191,753	14,222,382	329,880	276,500	142,223

*Includes output of merchant furnaces.

Many Technical Papers for Western Congress

Technical papers which are to be presented at the Western Metal Congress at San Francisco, Feb. 16 to 20, sponsored by the American Society for Steel Treating, are as follows:

Morning Session, Feb. 16—American Institute of Mining and Metallurgical Engineers.

"Improvements in the Physical Properties of Large Carbon and Alloy Steel Castings," by J. F. Frazier, Portland Cement United States Steel Corp.

"Alloying Steels," by G. H. Young, American Machine Steel Co.

"The Prevention and Elimination of Scale in the Treatment of Acid Iron-Oxide Pigments," by G. H. Young, American Machine Steel Co.

"Heat-Treated Steel," by G. H. Young, American Machine Steel Co.

"Alloying Steels," by G. H. Young, American Machine Steel Co.

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Afternoon Session, Feb. 19—American Society of Mechanical Engineers.

"Nitriding," by G. E. Harder, Battelle Memorial Institute.

"Creep of Metals at High Temperatures," by E. T. McVetty, Westinghouse Electric & Mfg. Co.

"Machinability of Metals," by A. H. d'Archeval, Pratt & Whitney Co.

"Seamless Rolled Cylinders," by H. L. M. Whitney, M. W. Kellogg Co.

Morning Session, Feb. 20—American Chemical Society.

"Recent Developments in Corrosion Prevention of Ferrous Metals," by F. N. Speller and V. V. Kendall, National Tube Co., Pittsburgh.

"Chromium and Chromium-Nickel Steels," by M. J. B. Morris, Republic Steel Corp.

"Corrosion and Lubrication of Valves," by George F. Scherer, Monro-Nordstrom Valve Co.

Afternoon Session, Feb. 20—American Institute of Electrical Engineers and Pacific Coast Electrical Association.

"Electricity in the Steel Mill," by G. E. Stoll, Westinghouse Electric & Mfg. Co.

"The Use of Electricity in the Heat Treatment of Steels," by George W. Bernhard, Pacific Gas & Electric Co.

Symposium on Welding by A.S.T.M. in March

Arrangements have been made by the American Society for Testing Materials to hold a regional meeting in Pittsburgh on Wednesday, March 18. This is the second meeting of the kind, the first having been in Detroit a year ago. A symposium on welding has been arranged as the technical feature of the meeting. The following tentative program has been prepared for the morning and afternoon sessions:

Morning Session

"Historical Introduction and General Survey," by E. T. Johnson, technical advisor to the president, United States Steel Corp.

"The Quality of Materials for Welding," by F. N. Speller and C. R. Textor, National Tube Co.

"Technical Examples of Modern Welding Practice," by A. M. Candy, general engineer, Westinghouse Electric & Mfg. Co.

Afternoon Session

The Inspection and Testing of Welded Products

(a) Fatigue and Impact Tests for Welded Connections

(b) X-ray Testing

(c) Magnetic Testing

(d) Stethoscopic Examination of Welded Products

(e) Practical Inspection of Finished Welded Products

The paper by A. M. Candy is a contribution from the American Welding Society, the Pittsburgh section of which is in charge of this symposium, and the paper by F. N. Speller and C. R. Textor is sponsored by subcommittee XXI on steel for welding, and the American Society for Testing Materials' committee A-1 on steel. The regional meeting will close with an informal dinner in the evening.

New England Council Takes Steps to Aid Employment

Measures regarded as most helpful toward increasing and maintaining employment in New England are presented in the report of a referendum conducted among New England manufacturers and other business interests by the industrial committee of the New England Council, State Building, Boston.

The committee recently placed before New England business men a list of measures calculated to promote employment maintenance and asked them to vote for those which they considered most effective and important. Of nearly 1000 individuals who replied, more than 60 per cent were manufacturers.

More than 70 per cent of those replying declared that the first essential is to hold actual layoffs to a minimum and substitute the elimination of overtime and the reduction of weekly hours. New England industry, it appears, is following this policy to an unprecedented degree at present, according to the council's industrial committee.

Next in order of emphasis is the recommendation to New England firms to merchandise aggressively by developing new products to meet new or changing needs; by finding new uses for present products; by improving quality and packaging, or presenting the product more attractively; by eliminating slow-selling lines, unprofitable accounts and territories, and by advertising consistently.

The third important step advocated by the consensus of replies calls upon New England employers to maintain employee morale by providing wages and working conditions on levels enabling their employees to prosper as well in New England as they might elsewhere, and to keep them informed on the employer's efforts to maintain steady work.

The fourth measure urged is that people with stable incomes buy for their normal needs.

Fifth in the order of importance established by the referendum is general industrial house-cleaning, including painting, overhauling and repairing. Two hundred manufacturers agreed upon this as an effective way to prepare for cheaper production and the increased demand of the future.

Research to find out what new products or changes in present ones consumers desire, to find ways to improve products or reduce cost without sacrifice of quality or service, constitutes the seventh recommendation.

To Manufacture Mill Rolls

The Ohio Steel Foundry Co., Lima, Ohio, has added to its activities the manufacture of carbon steel, alloy steel and electric steel mill rolls. The company has spent some time in research and preparation for the manufacture of rolls.

Steel Founders Seeking Better Technical and Sales Practices

MUCH constructive work beneficial to the steel foundry industry was done in 1930 by the Steel Founders' Society of America. This was brought out, in reports of officers and committees, at the annual meeting at the Hollenden Hotel, Cleveland, Jan. 29. Various activities of the society were outlined in an address by the president, John E. McCauley, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. Owing to Mr. McCauley's absence because of illness, John E. Galvin, Ohio Steel Foundry Co., vice-president of the Central-Atlantic division, presided.

Pointing out that the society has passed through a year of difficulty and depression, the president urged the members to throw off the cloak of pessimism which has pervaded the industry and to carry on their activities with optimism and with a will to accomplish things. Reviewing the activities of the society during the year, Mr. McCauley stated that valuable data had been gathered, analyzed and distributed to the members. Thirty new members were added since the reorganization, making the present membership 78.

Whole-hearted confidence in its officers, as well as sincere and enthusiastic support, was urged. Membership should be increased to represent at least 80 per cent of the country's capacity, and the society should have a prestige that would constitute a guiding influence in the industry. Members also were urged to cooperate heartily and to offer constructive criticism.

Condemns Selling Below Cost

The worst evil in the industry, in the president's opinion, has been the tendency of some manufacturers to sell castings at less than cost. Another evil is the refusal of some foundries to confine their sales efforts to their own geographical territories. These two evils, probably more than any others, added to confusion in the industry. He believes that the adoption of a uniform cost system will help to eliminate these evils. "If we are going to maintain our position in industry," declared Mr. McCauley, "it is important that we make sufficient profit so that we can replace our antiquated machinery with modern labor-saving devices, and thereby reduce our costs and improve our quality."

One important development of the year has been the establishment of a research department whose first work



W. H. Worrlow

will be to investigate the field of new uses for steel castings. With industry as a whole operating at only 60 per cent, the president said, it is not difficult to understand the necessity of such a step. Steel foundrymen have too long ignored the encroachments being made on their tonnage by other products.

Asks Support from 125 Foundries

To assure carrying out the society's five-year program of activities, Granville P. Rogers, managing director, in a comprehensive report, said that, while the increase in membership is encouraging, the society should have the active support of at least 125 foundries. The report reviewed the various activities of the organization during the year. A uniform cost system was adopted which is now the recognized standard for the industry. The foundries were urged to study and install the system and then be guided by it, rather than by reports of salesmen as to how other foundries are pricing their products.

A code of standard trade customs to govern the purchase and sale of steel castings has been created. Many buyers of castings have subscribed to the code and a growing number of steel foundries have adopted it. The society has challenged many misleading statements detrimental to cast steel, and has defended the product and the industry from unwarranted and unethical attacks, mostly from individuals interested in promoting

competitive products. The society was urged to bring before engineers, designers, buyers, technical schools and the public the advance made by the industry in recent years.

Industry Has Too Much Capacity

Referring to the excess capacity of the steel foundry industry, Mr. Rogers said that the idle and excess capacity in 1929, which was one of the biggest years in the industry, was 772,000 net tons. This excess capacity exceeded the total tonnage produced that year by all the electric, converter and crucible steel foundries. Operations during that year were sufficient to fill the foundries to only about two-thirds of their rated capacity. In the face of this situation the building of 20 new foundries was contemplated during the year, but after facts were presented as to present over-capacity nearly every project was abandoned.

Referring to the discouraging profit records of many basic industries, Mr. Rogers called attention to President Hoover's recommendation that a study be made of the anti-trust laws, which matter has been referred to the Senate Judiciary Committee. Mr. Rogers' recommendation was adopted that a committee be appointed to draft a letter to Sen. George W. Norris, chairman of that committee, endorsing a survey to determine the causes of lack of profits, and to develop remedies for relief.

Cooperation in Meeting Problems Reported

Constructive meetings of Eastern steel foundrymen were held during the year. This was brought out in an address by W. H. Worrlow, Lebanon Steel Foundry Co., Lebanon, Pa., vice-president, and chairman of the Eastern division. A local committee known as "New Uses Committee" was appointed, consisting of two open-hearth and four electric furnace men. Four meetings were held at different places in the vicinity of Philadelphia. These meetings developed suggestions for several new uses for castings and frank discussion of what the different foundries were doing.

Frequently it was found that one foundry had had considerable experience with the production of an article similar to that with which another foundry was struggling. Through a friendly interchange of ideas and discussion of common business problems there developed a re-

spect for any appreciation of each other that enabled the members to talk over matters very intimately. In addition, a general meeting was held in Springfield, Mass., and the results were so gratifying that another meeting will be held shortly.

The question of prices, according to Mr. Worrihow, has been a serious one in the East, but they are holding up surprisingly well, considering conditions. It was the conviction of many Eastern members that, while competition is very keen, it would have been much worse in the past year had there not been an understanding of the value of stabilized conditions. The speaker stated that, with the possible exception of an improvement in sentiment, there has been no change in the business situation in the East.

The competitive situation among steel foundries is in a better condition than for many years. In the opinion of Arthur Simonson, Falk Corp., Milwaukee, who delivered an address as vice-president and chairman of the Midwest-Southern division. He spoke of the helpfulness of group meetings and said that these should be held in other localities, where there are sufficient foundries close enough together to form a nucleus. The roster of the Midwest-Southern Division has nearly doubled in little more than a year.

John E. Galvin, speaking for the Central-Atlantic division, declared that innumerable new uses for steel castings can be developed. Those castings could be more generally used for traveling cranes, he pointed out, and he suggested that when foundrymen buy cranes they specify that steel castings be used wherever possible. Another field for the larger foundries is in the manufacture of cast steel ladles, which he believes are better and can be built more cheaply than fabricated ladles.

Making New Information Available

The Statistical Committee, of which C. A. McDonald, Stryer Steel Casting Co., Chicago, is chairman, reported that much of the information collected during the year is being made available to the steel foundry industry for the first time. The directory of manufacturers of steel and alloy castings was supplemented by information on production, capacity, furnace equipment, etc., and the compiling of a similar directory in 1931 was recommended. This committee will shortly make a survey to determine the tonnage of steel castings sold in each State, and also each Province in Canada, and likewise the tonnage sold to the various industries. A similar survey of heat and corrosion-resistant alloy castings will be made.

Use of the words "cast steel" on all steel castings where possible was recommended by the merchandising committee, of which T. H. Harvey, Ohio Steel Foundry Co., Lima, Ohio, is chairman. The board of directors has approved this recommendation and the managing director has been

authorized to have the necessary dies prepared for the production of metal strips bearing the words "cast steel" in sizes ranging from letters 1/2 in. to 2 1/2 in. high. These strips will be placed for mailing to patterns, and will be available in quantities desired, at cost.

This committee has given attention to developing a cast steel handbook or manual containing engineering information. It has also developed plans for cooperative advertising and a direct mail campaign.

The Industrial Research Committee, of which Harold S. Falk, Falk Corp., Milwaukee, is chairman, reported that in formulating a code of standard trade customs for steel foundries it had endeavored to prepare as simple a set of customs as possible, which would protect both buyer and seller of steel castings. It was the aim to exclude such provisions as were not generally practiced by most steel foundries.

Activities of the Technical Research Committee, R. J. Doty, Reading Steel Castings Co., Inc., chairman, were outlined. It was announced that a committee composed of members of the society will be selected shortly to act as a subcommittee of the joint committee of the American Foundrymen's Association on foundry education. The function of this committee will be to prepare, for distribution to engineers, recommendations regarding the design of steel castings.

Competition of Foreign Castings

Competition of foreign-made castings was brought up by Mr. Rogers, who had reports from members that a Cleveland company had bought 45-lb. cast steel wheels made in Germany at 4.55c. a pound, delivered, compared with 8.75c. a pound, quoted by American foundries. It was brought out that German-made steel castings have been sold in the East also. Mr. Rogers asked that members notify him when they receive information of any other inroads by foreign-made castings.

That the steel foundry business is on a slight uptrend was indicated by most of the reports of members. Many noted a better volume of inquiry and expect a gain in business in February. Some reported that they did a little better in January than in December, a few number that their business did not gain last month, and two or three did not do so well in January as in December. Two or three did not see much chance of a gain until railroads start to buy.

New Officers and Directors

Officers were elected as follows for the ensuing year: President, W. H. Worrihow, Lebanon Steel Foundry Co., Lebanon, Pa.; vice-president, Eastern division, G. R. Casey, Trendwell Engineering Co., Easton, Pa.; vice-president, Central-Atlantic division, W. W. Powell, Mesta Machine Co., Pittsburgh; vice-president, Midwest-Southern division, Arthur Si-

monson, Falk Corp., Milwaukee; vice-president, Mid-Continent division, Bartner Fleege, Oklahoma Steel Casting Co., Tulsa, Okla.

Members of the board of directors: Eastern division, three-year term, John E. McCauley, Birdsborg Steel Foundry & Machine Co., Birdsboro, Pa.; Central-Atlantic division, three-year term, Frank D. Glosser, Commercial Steel Castings Co., Mason, Ohio; Midwest-Southern division, three-year term, F. A. Lorenz, American Steel Foundries, Chicago; two-year term, F. J. Stanley, Michigan Steel Casting Co., Detroit; Mid-Continent division, three-year term, E. H. Cornelius, Oklahoma Steel Casting Co., Tulsa, Okla.; two-year term, H. E. Muchnie, Locomotive Finished Materials Co., Atchison, Kan.; for one-year term, C. A. Binder, St. Louis Steel Castings Co., St. Louis.

Following his election as president, Mr. Worrihow took the chair. He spoke of the numerous changes that have taken place in the steel foundry industry since the first organization was formed in 1902. These changes have resulted from the use of alloys, varied specifications, more difficult molding problems, a complicated price structure and increased competition with other products. In that time has developed the competition of alloyed cast iron, aluminum alloys and welded products.

Separate Group Meetings Held

Following the regular session separate meetings of the large casting and small casting divisions were held. George H. Friesel, United Engineering & Foundry Co., Pittsburgh, was chairman of the large castings division. This discussed costs, merchandising and profits on large steel castings. T. H. Harvey was elected chairman of this division for the ensuing year and W. E. Trump, Machined Steel Casting Co., Alliance, Ohio, was named as vice-chairman. The small castings division meeting was presided over by its chairman, L. S. Perego, Stryer Steel Casting Co. A debate on the advantages and disadvantages of mechanical equipment in the steel foundry was held by two brothers, Joseph L. Tillman, Jr., and Ralph F. Tillman, both of Industrial Steel Casting Co., Toledo. Clarence Tolan, Dodge Steel Co., Philadelphia, was elected chairman for the ensuing year. A vice-chairman will be elected by the Western group at a later meeting of that group.

The heat and corrosion-resistant alloy foundry division held a session Jan. 28 and received a report of the committee on standard form of guarantee. Consideration was given also to changing the present methods of disposing of scrap. It has been customary for casting producers to take back scrap castings, but it is now proposed that these be disposed of through regular scrap dealer channels. T. R. Heyward, Jr., Duralloy Co., Pittsburgh, was reelected chairman.

By-Product Coke-making Capacity

Considerably Increased in 1930

BY-PRODUCT coke ovens completed and placed in operation during 1930 totaled 686, with a coal carbonizing capacity of 5,356,000 net tons annually and a theoretical coking capacity of 3,749,200 tons. Potential coke production for the new units is figured as 70 per cent of the coal carbonization capacity—the generally accepted practice.

Of this total, 363 ovens, capable of carbonizing 2,742,000 tons of coal a year to produce 1,919,400 tons of coke, were under construction on Jan. 1, 1931, and were included in the total potential capacity on that date of 13,376 ovens, having a carbonizing capacity of 90,015,063 tons and a coking capacity of 62,859,383 tons. This was shown in tabular form in THE IRON AGE of Jan. 9, 1930, pages 199 to 201. An additional 323 units, capable of carbonizing 2,614,000 tons of coal yearly and producing 1,829,800 tons of coke, were undertaken and completed during the past year, bringing the total number of active ovens, as of Jan. 1, 1931, to 13,699, the carbonizing capacity to 92,629,063 tons annually and the coking capacity to 64,689,183 tons.

Only 68 ovens are under construction at the present time and when completed during the year will add 586,000 tons of carbonizing capacity

and 410,200 tons of coking capacity. The total potential capacity of the United States may therefore be placed at 13,767 ovens, capable of turning 93,215,063 tons of coal into approximately 65,099,383 tons of coke each year. Additional capacity will doubtless be undertaken during the year, but it is significant that less than one-fifth as many units were under construction at the beginning of 1931 as at the beginning of 1930.

Largest Increase by Iron and Steel Makers

Iron and steel companies contributed approximately two-thirds of by-product coke capacity added during 1930. In addition to the 219 ovens, with a coking capacity of 1,242,500 tons, which were under construction at the beginning of the year and later placed in operation, 245 units, capable of producing 1,453,300 tons of coke were completed. These brought the total capacity of iron and steel companies, as of Jan. 1, 1931, to 10,985 ovens, with a coal carbonization capacity of 71,566,385 tons and a potential coke output of 49,682,480 tons. No new by-product oven construction by iron and steel makers was under way at the beginning of the year.

Commercial or gas plants last year added 222 ovens, with a coke capacity

of 1,052,800 tons. Of this number, 144 units, with a coking capacity of 676,900 tons, were under construction at the beginning of the year and were included in the tables published a year ago. With the addition of 78 ovens undertaken and completed during 1930, 375,900 tons of coking capacity was placed in operation, bringing the total active capacity of this classification at the beginning of the year to 3614 ovens, having a carbonizing capacity of 21,062,678 tons and a coking capacity of 15,006,703 tons. All of the 68 ovens under construction at the beginning of this year are designed for gas plant use and will result in a potential capacity in this classification of 3682 ovens, capable of carbonizing 21,648,678 tons of coal annually to produce 15,416,903 tons of coke.

Plant additions during 1930 and under construction for completion this year are shown in the accompanying table.

Lower Cost of Living Reported

Pertinent, as bearing on the present situation with regard to both wage rates and unemployment, is a report of the United States Bureau of Labor Statistics dealing with the cost of living. A reduction of 6.2 per cent is reported for December, 1930, compared with one year earlier. This is based on the Bureau's semi-annual survey conducted in 32 widely scattered cities all over the United States. The reduction was progressive, as the figure for December was 3.5 per cent lower than in the preceding June.

Compared with periods considerably further back, the cost of living is reported in December, 1930, at 60.7 per cent above the average of 1913. It was, however, 25.8 per cent lower than in June, 1920.

Over the longer range food has held closest to the pre-war level of any of the half-dozen general items surveyed. Compared with 1913 it was up 37.2 per cent. Rents represent an increase over 1913 of 46.5 per cent; clothing, of 53 per cent; fuel and lighting, 75 per cent; housefurnishing goods, 88.3 per cent; and miscellaneous items, 108.1 per cent.

Considerable diversity appears among the different localities, those on the Pacific Coast and those in the Southern States showing smaller advances from the pre-war level than do the Eastern and Northern cities.

Completed During 1930

Completed During 1930		Annual Capacity in Net Tons	
Plant	No. Ovens	Coal	Coke
IRON AND STEEL COMPANIES			
Bethlehem Steel Co., Johnstown, Pa.	*77	570,000	393,000
Sparrows Point, Md.	*61	353,000	247,100
Colorado Fuel & Iron Co., Pueblo, Colo.	31	273,000	191,100
Danma-Hanna Coke Corp., Buffalo, N. Y.	51	353,000	251,300
Illinois Steel Co., Gary, Ind.	138	1,230,000	861,000
Jones & Laughlin Steel Corp., Woodlawn, Pa.	*81	852,000	596,400
Weirton Steel Co., Weirton, W. Va.	25	215,000	150,500
**Total Additions.....	243	2,077,000	1,453,300
Total Jan. 1, 1930.....	9,840	69,489,385	48,228,580
Total Jan. 1, 1931.....	10,083	71,566,385	49,682,480
COMMERCIAL PLANTS			
Consumers Power Co., Jackson, Mich.	11	35,000	24,500
New England Fuel & Transportation Co., Everett, Mass.	***149 *	1,117,000	781,500
Providence Gas Co., Providence, R. I.	*25	188,000	131,600
Rochester Gas & Electric Corp., Rochester, N. Y.	*57	164,000	114,500
**Total Additions.....	78	537,000	375,900
Total Jan. 1, 1930.....	3,536	20,525,678	14,630,803
Total Jan. 1, 1931.....	3,614	21,062,678	15,006,703
TOTAL ALL PLANTS.....	13,699	92,629,063	64,689,183

Under Construction on Jan. 1, 1931

Consolidated Gas Co., Hunt's Point, N. Y.	27	320,000	224,000
Hudson Valley Fuel Corp., Troy, N. Y.	31	266,000	186,200
Total Under Construction.....	68	586,000	410,200
GRAND TOTAL POTENTIAL CAPACITY.....	13,767	93,215,063	65,099,383

*Under construction on Jan. 1, 1930, and included in last published list.

**Not including additions carried in last published total.

***2 ovens of this installation included in last published total.

PERSONALS

CLAUS GREVE, heretofore president of the Cleveland Pneumatic Tool Co., Cleveland, has been elected chairman of the board, and his son, L. W. GREVE, who has been treasurer, has been made president. JOHN DEMOOY has become treasurer. L. W. Greve is president also of the Cleveland Pneumatic's two associated companies, Champion Machine & Forging Co. and the Cleveland Rock Drill Co. Officers reelected are: H. W. FOSTER, vice-president; H. S. COVEY, secretary, and ARTHUR SCOTT, superintendent.

HOWARD BURT has become manager of the engineering and export department, with office at 50 Church Street, New York, for the William Powell Co., Cincinnati, manufacturer of valves and engineering specialties.

HYMAN BORNSTEIN, director of laboratories, Deere & Co., Moline, Ill., will speak on "Modern Core Room Practice" at a meeting of the Quad-City Foundrymen's Association, to be held at LeClair Hotel, Moline, on Feb. 18.

LOUIS O. KLINGELHOFER has been elected vice-president and treasurer of the Pittsburgh Bridge & Iron Works, Pittsburgh, and J. A. McEWEN and H. N. TRIMBLE have been made vice-presidents. FULLER F. ROSS has become secretary. EDWARD K. KLINGELHOFER, as announced in these columns on Dec. 11, is the new president.

H. DUDLEY JONES has been placed in charge of the steel department of the Wilkoff Co., Youngstown, succeeding PHILIP P. BROWN, who has severed his connection with the company.

A. E. BALLIN has retired as president and director of the McIntosh & Seymour Corp., Auburn, N. Y., maker of Diesel engines. He is being succeeded by R. B. McCOLL, who has been manager since 1925 of the Schenectady, N. Y., plant of the American Locomotive Co., holding company of the McIntosh & Seymour Corp. Mr. McColl has had a wide experience in railroad and locomotive work.

W. W. HANCOCK has been elected secretary of the Republic Steel Corp., Youngstown, to fill the vacancy created by the recent resignation of RICHARD JONES, JR. Mr. Hancock was formerly vice-president of the Donner Steel Co., Inc., Buffalo, now a unit of the Republic corporation. Previously he was associated with William H. Donner, at Donora,

Pa., and from 1912 to 1916 was with Mr. Donner at the Cambria Steel Co. He became secretary and director of the Donner Steel Co. when that was formed in 1916 and was placed in charge of the ore department of the company.

J. E. LAWTON has been placed in charge of the newly-organized steel and alloy roll sales department of the Ohio Steel Foundry Co., Lima, Ohio. He was formerly with the Wheeling Mold & Foundry Co.

HAROLD S. FALK, vice-president and works manager, Falk Corp., Milwaukee, has been appointed Wisconsin civilian aide to the Secretary of War, filling the vacancy caused by the death of Wheeler P. Bloodgood, of Milwaukee. The principal activity relates to the Citizens' Military Training Camps. Mr. Falk has been chairman of the Wisconsin Association, C. M. T. C., for the past three years.

WILLIAM S. BRASHEAR, for 22 years identified with the Barnard & Lease Mfg. Co., Moline, Ill., maker of milling machinery, has been elected president and general manager. He has been sales manager of the company since 1915. Mr. Brashear succeeds A. R. WIEGEL.

WALTER KIDDE, head of Walter Kidde & Co., Inc., and Walter Kidde Constructors, Inc., 140 Cedar Street, New York, and chairman of the Sacks-Barlow Foundries, Newark, N. J., and a director of the Jenkins Mfg. Co., Bloomfield, N. J., was honored by his business associates recently by the presentation of a medal commemorating Mr. Kidde's thirtieth year in business. Mr. Kidde is also chairman of the board of trustees of Stevens Institute of Technology, from which he was graduated in 1897.



W. M. LEVETT has resigned as vice-president and general manager of Welker-Hoops Mfg. Co., Middletown, Conn., and also as president of the Continental Casting Co., a subsidiary.

F. C. SCHWARTZ has been appointed general manager of the Steubenville Works, Wheeling Steel Corp., succeeding E. N. MCKELVEY, who has resigned. Mr. Schwartz has been assistant manager of this plant for the past nine months, and previously was identified for a number of years with the American Steel & Wire Co. at Cleveland. He has been actively associated with the steel industry for about 25 years.

GEORGE PUCHTA, president, Queen City Supply Co., Cincinnati, and one of the veterans of the mill supply business, on Feb. 2 celebrated the fiftieth anniversary of his entrance into this business. Mr. Puchta and F. X. PESO in 1890 organized the Queen City Supply Co. and purchased the mill supply business of Post & Co. He has been actively engaged as a mill supply distributor since that time. He will celebrate his seventy-first birthday on April 8. Mr. Puchta has been prominent in the affairs of the National Supply and Machinery Distributors' Association and was the second president of that organization.

C. I. OCHS has been elected president of the Wilcox-Rich Corp., Detroit, to fill the vacancy caused by the recent death of Carl H. L. Flintermann. Mr. Ochs is president of Eaton Axle & Spring Co., Cleveland, with which the Wilcox-Rich Corp. is affiliated. C. W. MILLER has been made vice-president and general manager of the latter corporation. He was formerly vice-president of the Thompson Products, Inc., Cleveland.

A. C. MORSE has retired as chairman of the board of the Ohio Seamless Tube Co., Shelby, Ohio, with which he had long been connected in various capacities, starting as a workman in the factory and later being president and general manager. R. C. SKILES, member of the board of directors, has succeeded him as chairman.

O. KUHLER has opened offices in the Graybar Building, 420 Lexington Avenue, New York, as a consulting design engineer. He will specialize in design of metal products with particular relation to eye appeal and the development of new uses and new markets. He has been identified with the Krupp and Stinnes organizations in Germany as a consulting design

engineer and has done work for various steel companies in this country, winning distinction for his etchings of iron and steel plant scenes.

E. A. McCALLUM, with offices in the Russ Building, San Francisco, has been appointed district manager of the Stacey Engineering Co., which includes Connersville Blower Co., Inc., P. H. & F. M. Roots Co., Wilbraham-Green Blower Co. and Stacey Brothers' Gas Construction Co., all of Connersville, Ind.

ALBERT TROLL, heretofore vice-president of the Belmont Stamping & Enameling Co., New Philadelphia, Ohio, has been elected chairman of the board. N. W. JUDKINS, general manager and secretary-treasurer, has been made president and treasurer. JOHN T. TROLL has become vice-president, and FRED F. HALL, secretary.

BENJAMIN SCHWARTZ, director general of the Institute of Scrap Iron and Steel, Inc., will be the principal speaker at the annual executive meeting of the Columbus, Ohio, Association of Purchasing Agents at its dinner meeting on March 9. Mr. Schwartz recently addressed the annual convention of the National Association of Purchasing Agents and a number of local branches of the association on the problems of the scrap iron dealers in relation to the producers and consumers of scrap.

GEORGE W. BUNNER, who has been general superintendent of the Warner Gear Co., Muncie, Ind., has been advanced to the newly-created position of works manager. He has been succeeded as general superintendent by J. O. MOORE, heretofore assistant general superintendent.

JESSE V. HONEYCUTT, formerly sales agent in New York for frogs, switches and railroad material for the Bethlehem Steel Co., has been appointed manager of sales of frogs and switches, with offices at Bethlehem, Pa. He has succeeded NEIL E. SALSICH, who resigned to become vice-president in charge of sales of the Jeffrey Mfg. Co., Columbus, Ohio.

HENRY D. SHARPE has been made chairman of the board of directors of the Providence, R. I., Community Fund, following his retirement as president, an office which he held since the fund was established five years ago.

B. HOWARD LESTER, vice-president of the Perry-Buxton-Doane Co., with headquarters at the South Boston plant, has severed his connection with that company. W. H. LANE, formerly of Portland, Me., has taken over Mr. Lester's duties. Mr. Lester was associated with the company for 39 years. He has made no plans for the immediate future.

OBITUARY

PHILIP KEMPTER, works manager of Geuder, Paeschke & Frey Co., Milwaukee, who was one of the pioneers in the development of metal stampings in the United States, died Jan. 26, after a long illness. Mr. Kempter was 64 years of age and had been associated with the Geuder, Paeschke & Frey Co. for 33 years. For some time prior to his death he was works manager of that company. Mr. Kempter was known wherever steel stamp-



Philip Kempter

ings were used. He was responsible for the development of many of the metal stampings used by the automobile industry and is credited with having made the first steel oil pan for motor cars. He had been recognized for many years as an expert in problems of deep drawing of metal and had successfully developed many intricate stampings. Mr. Kempter was born in Galena, Ill., and joined the Milwaukee company in 1898.

WILLIAM D. BARTLETT, senior vice-president, Thompson Products, Inc., Cleveland, died on Jan. 30, aged 57 years. He had been connected with the company since 1902, starting as an assistant to the superintendent and later serving as factory manager. He developed the Bartlett process for heading airplane and automobile valves.

FRANK H. HAMBLIN, for nearly half a century treasurer of the Hamblin & Russell Mfg. Co., Worcester, Mass., manufacturer of wire goods and hardware specialties, died at his home, Jan. 29, aged 77 years. He was born in East Boston, Mass., and was educated in the Boston public schools. As a young man he was a profes-

sional pianist and afterward conducted restaurants in Boston. In 1883, in partnership with William T. Russell, of Wellesley, Mass., he bought the business of the Ayers Mfg. Co., Worcester, manufacturer of wire specialties, and in 1887 the name was changed to the Hamblin & Russell Mfg. Co. Mr. Russell became the president, which office he still holds, and Mr. Hamblin the treasurer. The business expanded rapidly, until it was one of the most important in its special line in New England.

LUCIAN SHARPE, a vice-president of Brown & Sharpe Mfg. Co., died suddenly on Jan. 26, at Chablis, France, while on a motor trip, according to a cablegram received the next day by his brother, Henry D. Sharpe, president of the company. He was born in Providence, July 16, 1871, received his preparatory education in the public schools there, and after his freshman year at Yale University, entered Brown University in 1890, graduating three years later with the degree of A.B. He then became identified with the Brown & Sharpe Mfg. Co. For the past several years he had made his home abroad.

JAMES H. HOOKER, president of the Sinker-Davis Co., Indianapolis, died at his home in that city, after a six weeks' illness. He became identified with the company as an errand boy and became president about 40 years ago. He was 72 years old.

JOHN T. CULLEN, president of the Cullen Co., Clinton, Iowa, died on Jan. 19 in Davenport, Iowa, as the result of injuries sustained a few days before in an automobile accident. He was 72 years old.

ARTHUR T. DOUB, works manager for the Louisville, Ky., plant of the American Air Filter Co., known as the Reed Air Filter Co., died on Jan. 20. He had been associated with the company for the past three and one-half years.

CHARLES L. TURLEY, formerly blooming mill superintendent at the Aliquippa, Pa., steel works of the Jones & Laughlin Steel Corp., after an illness of nearly two years, died in Los Angeles, Jan. 17, aged 39 years. After graduation from Cornell University in 1914, he entered the employ of the Wheeling Steel Corp., in the blast furnace department, later becoming assistant superintendent. He became identified with the Jones & Laughlin Steel Corp. in 1921 as assistant superintendent of the blooming department and one year later became superintendent. In December, 1923, he assumed full charge of the steel works and continued in that capacity until

he resigned in 1929 on account of poor health.

GEORGE J. POTTS, president, C. & G. Potts & Co., Indianapolis, Ind., foundry and machine shop, died on Jan. 9, after an illness of about three weeks. Mr. Potts, who was 40 years old, had been a lifelong resident of Indianapolis.

JAMES MORPETH, for many years general superintendent of the Brown & Sharpe Mfg. Co., Providence, R. I., died on Jan. 15, at Tangerine, Fla., where he had been for some weeks because of ill health. He was born in Carlisle, England, 67 years ago, and came to this country with his parents at an early age. From a machinist apprentice he worked his way up to the position of general superintendent.

EDWIN R. MACK, who in partnership with the late Austin H. Campbell established the Monarch Machine Co., Philadelphia, 26 years ago, died Jan. 29 at his home in Mount Airy. For the past two and a half years Mr. Mack had been the proprietor of the company, his partner having withdrawn.

R. C. NICHOLAS, a partner in Nicholas & Miller, Chicago pig iron brokers, died on Feb. 1, after a brief illness. He had been engaged in the marketing of pig iron throughout his entire business career. For a number of years he had been identified with Thomas A. Mack, Cincinnati, and at one time was Chicago manager for Walter Wallingford & Co. He formed the partnership with Mr. Miller in 1926. Mr. Nicholas was 55 years old.

JAMES P. CUMMISKEY, who was identified in an executive capacity with the John Mancey Co., iron pipe manufacturer, Philadelphia, died of a heart attack at his home in that city on Jan. 27.

JOHN DAVEY, superintendent, Canton Tin Plate Corp., Canton, Ohio, who formerly served in a similar position with the Empire Steel Corp., Mansfield, died Jan. 25. He was one of a family of seven brothers long associated with the sheet steel industry in Ohio.

JOHN FRANKLIN LEWIS, who was assistant general superintendent at Edgar Thomson Works, Carnegie Steel Co., Pittsburgh, before his retirement in 1925, died at his home in that city on Jan. 26, aged 68 years. He entered the steel industry in 1875, working his way to the assistant general superintendency of Edgar Thomson Works in 1903. He was credited with many important inventions and developments in the steel industry, including the vertical hydraulic ingot stripper, steel tie fastenings, and a blast furnace stock distributing device.

Personnel Work Expanding

Social Aspect of Labor Administration Becoming More Widely Recognized

PERSONNEL administration in American industry has suffered no serious results from the current business depression, according to Edward S. Cowdick, industrial relations counsellor, New York, one of the speakers at the personnel conference held by the American Management Association at the Hotel Niagara, Niagara Falls, N. Y., Feb. 2, 3 and 4.

"There has been no general abandonment of modern industrial relations policies," Mr. Cowdick said. "Few, if any, companies have scrapped their personnel programs; on the contrary, some companies expanded their industrial relations work during 1930. Few industrial relations men have been released. Managing executives are taking more interest in labor administration than ever before in the history of American business. There has been some change in emphasis in industrial relations work, because of new conditions that have had to be met during the depression period."

Pointing out that the survival of personnel departments and programs in 1930 was in striking contrast to the effects of the business depression of 1920-22, Mr. Cowdick expressed the opinion that the difference was due largely to changing philosophies and practices in industrial relations work. Personnel departments now render staff assistance to operating executives and directors of industrial relations have become expert in advising their companies upon labor policies. The theory formerly held that personnel management should function as a separate executive department has been largely abandoned.

Discussing the changes in emphasis which he said had characterized industrial relations work since the beginning of business recession in 1929, Mr. Cowdick said that there had been less work for employment departments since most companies have been hiring few or no new employees. Attention of personnel men has been given largely to protection of the jobs and earnings of the workers. This protection has been afforded, for the most part, through short time and distribution of work, through regulation of lay-offs, and through the payment of dismissal compensation to employees necessarily released.

The speaker called attention to the new attitude of the majority of employers toward wage levels. "In contrast to the demand for 'liquidation of labor,' widely voiced in the earlier period, the present depression has seen an unexampled effort by employers to maintain wage rates, purchasing power and living standards," he said.

Significant developments in the

field of personnel management in the last ten years were outlined by J. H. Willits, professor of industry and director of industrial research, Wharton School, University of Pennsylvania, at another session of the conference.

"Personnel administration has ceased to be the 'morganatic wife' of business management and has been built into the structure as an integral part of operating business management," said Doctor Willits. "Personnel management and personnel managers have tended to become much less evangelical and sentimental and more ready to seek for and base their ideas and policies upon facts."

The psychology of American industry on the subject of wages has been changing, he pointed out. "The attitude which seeks to make wages as high as possible rather than as low as possible is one of the most promising ideas so-called capitalistic society has produced." On the basis of these and other changes, Doctor Willits predicted that the most significant developments in industry in the next 10 years would include:

1. Increasing sense of social responsibility by industry—and perhaps along side of that—an increasing participation by the State in the maintenance and establishment of minimum standards in industry.
2. The attainment of a greater measure of security from the hazards of industry and most particularly from the hazards of old age and unemployment.
3. A shorter working week.
4. Increasing concentration upon high quality and upon the methods of improving the quality of executive management and leadership in business.
5. Increase in research in economic and particularly industrial relations problems.
6. Change in the emphasis within industrial psychology by which greater attention will be devoted more directly to an understanding of human behavior in industry through the study of the emotions.

Management's initiative in departing from traditional practices, such as reducing the working forces when decreased demand has lessened production and maintaining inflexible working hours and work weeks, was also commented upon by J. W. Dietz, superintendent industrial relations, Kearney Works, Western Electric Co., who presided at the round table conference on "Hours, Vacations and the Working Week."

Mr. Dietz predicts a more closely knit relationship between industry and the community—a relationship which will take into consideration the workers' problems when not at work as well as on the job.

U. S. Steel Pension Fund Distributes \$4,359,445

The twentieth annual report of the United States Steel and Carnegie Pension Fund shows that in 1930 a total of \$4,359,445.90 was distributed as pensions among retired employees of the United States Steel Corp. and its subsidiary companies. Carnegie Steel Co. was first among the subsidiaries in the amount paid to retired employees, the sum being \$1,040,139.44. Some of the bigger subsidiary companies, and their pension disbursements, were: American Steel & Wire Co., \$768,114.97; National Tube Co., \$546,031.13; American Sheet & Tin Plate Co., \$543,683.10; H. C. Frick Coke Co., \$372,582.35; Illinois Steel Co., \$226,784.44; American Bridge Co., \$197,262.48; Oliver Iron Mining Co., \$176,849.30; Duluth, Missabe & Northern Railway Co., \$104,014.55; Tennessee Coal, Iron & Railroad Co., \$72,172.50; Elgin, Joliet & Eastern Railway Co., \$53,893.75; Bessemer & Lake Erie Railroad Co., \$53,089.40; Lorain Steel Co., \$35,670.75; and Union Railroad Co., \$26,631.80.

There were 1154 employees added to the pension roll during 1930 and 618 removed from the list. Of the 13,694 employees retired from 1911 to 1930, inclusive, 7956 were on the pension roll at the close of 1930. The average age of the 1154 employees retired in 1930 was 63.59 years; their average period of service was 34.51 years, and the average monthly pension, \$55.70.

The total amount paid in pensions since the inauguration of the pension plan on Jan. 1, 1911, was \$30,625,546.72.

The beneficiaries of the pension fund make no contributions to the fund, the income of the latter being derived from a fund created jointly by Andrew Carnegie and the United States Steel Corp.

National Steel Earnings Over \$4 a Share in 1930

The National Steel Corp. showed net earnings, after all charges and Federal tax, of \$8,615,597, or \$4.05 a share, on the average stock outstanding during 1930, the first full year of its existence, according to a preliminary report made public Tuesday. These earnings were more than double the \$2 annual dividend rate and were equivalent to \$4.01 a share on the number of capital shares outstanding at the end of the year.

Wire Screen Cloth Makers Form an Institute

The Wire Screen Cloth Manufacturers' Institute has been organized by some of the important companies in that industry. George E. Watson, formerly sales manager of the Wickwire Spencer Steel Co., Buffalo, has

been appointed general secretary, with office at 74 Trinity Place, New York. The purposes of the institute are to operate a trade extension bureau to assist jobbers and dealers in selling wire screen cloth; to collect statistics; to study manufacturing methods, safety, transportation and merchandising problems; to promote standardization of product, and to develop a uniform method of cost accounting.

Inland Steel Co. Earned \$5.42 a Share in 1930

Inland Steel Co., Chicago, has reported net profits for 1930 of \$6,498,966, equivalent to \$5.42 a share on the capital stock outstanding. Total profits for the year were \$11,640,129, from which \$4,799,163 was deducted for depreciation and depletion, interest on bonds and estimated Federal taxes, and \$342,000 was deducted for the employees' savings and pension fund. A quarterly dividend of \$1 a share on the capital stock was declared.

Fabricated Steel Orders at 58.4 Per Cent in 1930

WASHINGTON, Feb. 3.—Bookings of fabricated structural steel in 1930 reported to the Bureau of the Census by an average of 225 establishments totaled 2,364,067 tons, a decrease of 836,574 tons from the 3,190,641 reported in 1929 by an average of 234 establishments.

Bookings reported by 216 establishments totaled 133,560 tons in December, compared with 182,804 tons reported for November by the same number of fabricators.

The computed orders for all plants in 1930 were 2,804,800 tons, representing 58.4 per cent of a rated annual capacity of 4,800,000 tons. Orders in 1929 were estimated at 3,597,825 tons, or 77.9 per cent of capacity.

Swedish Metallurgist to Address Steel Treaters

New York steel treaters, at their February meeting, will be addressed by Dr. Arne F. Westgren, a distinguished Swedish metallurgist and chemist, and professor in the University of Stockholm. The meeting will be held in the rooms of the Building Trade Employers' Association, 2 Park Avenue, Monday evening, Feb. 9, at 8 o'clock. Doctor Westgren's subject will be "The Crystal Structure of Ordinary and Alloyed Steels." An informal dinner at 6.30 o'clock will precede the lecture.

"The Freezing Point of Nickel as a Fixed Point on the International Temperature Scale" is the title of Research Paper No. 258 of the United States Bureau of Standards. The authors are H. T. Wensel and W. F. Roeser.

Bethlehem Steel Earnings 17c. a Share in Quarter

The Bethlehem Steel Corp. on Jan. 29 announced that its earnings in the final quarter of 1930 were equal to 17c. a share on the common stock outstanding, making a total of \$5.26 for the year, or 74c. less than the required \$6 for common dividend payments. The regular quarterly dividend on the common was declared.

Total income for the fourth quarter was \$7,418,383, compared with \$8,943,217 in the third quarter, while the total for the year was \$45,233,644, compared with \$67,469,245 in 1929. The net income, after depreciation, interest and other charges, was \$2,291,000 for the fourth quarter, against \$3,783,425 in the third quarter, while the year's net income was \$23,843,406, against \$42,242,980 in 1929.

There was a large reduction in interest on bonded indebtedness owing to the retirement of bonds, the 1930 payments having amounted to \$7,172,517, against \$11,217,180 in 1929. Dividend payments on common stock were higher, amounting to \$19,200,000 for 1930, against \$15,600,000 in 1929.

Cash expenditures for additions and improvements to properties in 1930 were \$47,158,001, while the estimated cost to complete construction authorized and in progress on Dec. 31, last, was \$14,820,449. Operations in the fourth quarter averaged 42.5 per cent and for the year were 61.7 per cent. The operating rate for last week was given as 46 per cent.

Cash and liquid securities on Dec. 31, last, were \$57,818,962, compared with \$196,019,078 (including cash reserved for the retirement of bonds) on Dec. 31, 1929.

After the directors' meeting, President E. G. Grace discussed current business conditions and the outlook. From a 30 per cent operating rate in December, Bethlehem was up to 46 per cent last week, and a further increase in operations is scheduled. Mr. Grace stated, on the basis of orders already in hand or in sight. Orders are mostly small and for immediate requirements, but are coming from widely scattered sources. Mr. Grace said that he looked for a gradual improvement in steel business throughout 1931, but said that the first quarter of the year would be disappointing when compared with the first quarter of 1930. He predicted, however, an appreciable gain in operations and earnings over the fourth quarter of last year.

Bethlehem's average billing price on its finished products in 1930 was \$5.03 a ton lower than the 1929 average. The average billing price for the fourth quarter was \$6.10 a ton below the average of the fourth quarter of 1929. Mr. Grace said that current billing prices were showing a gain over those of the past quarter, but the amount cannot be estimated until the final results for the quarter are tabulated.

January Brought Gains in Machine Tool Sales

Improvement May Not Be General, But
Some Companies Report Largest
Orders in Months

THERE was an improvement in machine tool business in January over that of December, but apparently it was not uniform throughout the country. In the New York district, for example, some machinery dealers had the largest volume of business since the second quarter of 1930, but in other sections of the country little or no improvement over December was in evidence. Small

gains are reported from New England, Chicago and Milwaukee.

Much of the business that was placed in the past month was the result of decisions made some time ago, but upon which action was withheld until the new year. Thus, it does not appear certain whether the gains are the beginning of a definite upward movement. It is believed that the next few weeks will determine if the

machine tool business curve may be expected to keep its upward trend.

A large machine tool manufacturer at Cleveland reports that its January sales were the largest in three months. A Milwaukee company has had a similar experience. The forthcoming report of the National Machine Tool Builders' Association for January will tell to what extent the improvement has been general.

New York

Continued improvement in orders has characterized the Eastern machine tool situation the past week. Leading sellers say that total sales for January will exceed those of any month since the second quarter of 1930. Much of the business that has been placed has been under consideration for some time and has come in small lots from widely scattered sources. An exception was an order for several large machines from Alco Products, Inc., a subsidiary of the American Locomotive Co., which recently booked a large contract for fabricated steel pipe for the Borough of Queens, New York. The machine tool trade believes that if the current rate of improvement continues through February it can definitely be considered that business has turned the corner.

Cincinnati

With an improvement in the volume of inquiry, district machine tool manufacturers report a better feeling in the market. Bookings, however, continue small. All plants are running on short time.

Cleveland

Although the machine tool trade finds a little more interest is being taken in new tools, largely for replacement, orders are still scarce.

Dealers' January business showed little change as compared with December. There is an improvement in certain directions, however, as indicated by sales of turret lathes by a Cleveland manufacturer, whose January business was the best in three

months. No orders were for more than two machines. Scattering inquiry for single machines continues, but no orders of size are in prospect.

Pittsburgh

Sales by local machine tool dealers in January fell under the low levels in December and aggregate business last month was the poorest several dealers have had in the first month of the year since 1921. Orders placed were generally for single tools and new inquiry is of a similar nature.

One large buyer in this district issued a small list the past week, but the totals are so far below normal expectations that dealers are disappointed. The larger structural steel fabricators and barge builders in the locality are doing no buying and railroad business is still conspicuously absent. Steel companies have a few tools to buy in connection with plant improvements.

Milwaukee

Machine tool builders entered February with order books the most favorable in fully six months and a relatively excellent month's business before them. Working hours have been increased in most plants. Substantial orders for milling machines have been placed with the Kearney & Trecker Corp., during January by Westinghouse Electric & Mfg. Co., Columbia Axle Co. of Cleveland, and Jones & Laughlin Steel Corp. The Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has in production orders for its new table type precision horizontal boring, drilling and milling machines from many sections

of the country. Tool builders in other Wisconsin cities likewise find much encouragement not only in current orders but from inquiries received.

Chicago

February finds the machine tool trade somewhat cheered by a small but significant turn for the better in inquiries, and the fact that users of machine tools see hope for more work on the score that they are being asked to make more estimates. Sales remain sluggish, however, and are confined to a tool here and there. With most dealers well stocked with used machine tools, auction sales are attracting little attention and bids are low.

The Santa Fe opened bids Feb. 2 and the trade is hopeful that bids will be tabulated promptly. Among promising inquiries are two 24-in. x 10-ft. lathes, a 15-in. x 12-ft. lathe, a 16-in. x 10-ft. lathe, a 24-in. shaper and a 5-ft. radial drill.

New England

Business with dealers appears at a standstill, but many transactions have been made quietly, details being withheld because of keen competition. January business made a better showing than that in December, and dealers state there are indications that February sales will exceed those last month. New England machine tool builders in general are operating two to three days a week. Pipe machines, radial drills, shapers and tool room lathes were sold by used tool dealers the past week, individual sales generally being single tools.

New York

AN expansion program to cost about \$3,500,000 will be carried out by Sinclair Consolidated Oil Corp., 45 Nassau Street, New York, at oil refining, storage and distributing plant at Sincro, near Houston, Tex., to practically double present capacity. Company engineering department is in charge.

O. J. Maigne Co., 356 Pearl Street, New York, manufacturer of printers' rollers, etc., has plans for a three-story and basement plant at Washington, to cost over \$60,000 with equipment. Dodge & Morrison, 160 Pearl Street, New York, are architects.

North American Co., 60 Broadway, New York, operating electric light and power properties, is arranging a budget of \$51,000,000 for expansion during 1931, to include work on initial unit of new steam-operated electric generating plant at Port Washington, Wis., for Milwaukee Electric Railway & Light Co.; increase in capacity of steam-operated electric generating plant of Cleveland Electric Illuminating Co., at Ashtabula, Ohio, work on which is in progress; increase in capacity of steam-operated power plant of Potomac Electric Power Co., Washington, known as Benning Station, on which work has begun and extensions in transmission lines for different properties, power substations, etc.; also expansion in artificial gas plants. Company has disposed of a bond issue of \$25,000,000, part of fund to be used for program noted. Engineering department is in charge.

Catskill Metal Works, Inc., Catskill,

N. Y., recently organized with capital of \$75,000 by Theodore L. Seaman, Catskill, and associates, plans operation of local factory for production of metal ornaments and other metal products. Gilbert M. Seaman, Catskill, will also be an officer of new company.

David S. Lang, 1860 Broadway, New York, architect, has plans for a two-story automobile service, repair and garage building, 80 x 150 ft., to cost close to \$100,000 with equipment.

American Smelting & Refining Co., 120 Broadway, New York, has awarded general contract to Buss Construction Co., Sunderland Building, Omaha, Neb., for four-story storage and distributing plant at Omaha, to cost over \$50,000 with equipment.

American Commonwealth Power Corp., 120 Broadway, New York, has acquired plants and property of International Utilities Corp., Calgary and Edmonton, Alta., including buildings in Alberta, Saskatchewan and British Columbia. Properties will be operated under name of Dominion Gas & Electric Co. and expansion will be carried out, including transmission lines.

Mullen Adjustable Rack Corp., New York, recently formed by Sydney C. Stern, 27-10 Sixty-third Street, Woodside, N. Y., and associates, plans operation of factory for manufacture of a patented rack and other tools.

Meyer-Lewis Corp., Newark, has leased factory of Peckham Mfg. Co., at 214-18 South Street, for new plant for manufacture of metal goods.

F. J. Rooney Lamp Co., 1217 Willow Avenue, Hoboken, N. J., manufacturer of radio tubes and equipment, has purchased for expansion one-story factory of Falcon Radio Corp., Clinton and Kibben Streets, on site 175 x 200 ft.

Standard Oil Co. of New Jersey, 26 Broadway, New York, has taken bids on general contract for a bulk oil storage and distributing plant at Hackensack, N. J., consisting of three one-story units with pumping plant, automobile service and garage building, etc., to cost over \$50,000 including equipment. Company engineering department is in charge.

Searles Mfg. Co., 27 Mulberry Street, Newark, manufacturer of bathroom fixtures and equipment, has leased property at 163-67 Ogden Street, for new plant for increased capacity.

Fulton Specialty Co., 125-12 Fulton Street, Elizabeth, N. J., manufacturer of rubber products, plans rebuilding four-story plant destroyed by fire Jan. 27, with loss over \$100,000 including equipment. Company contemplates leasing a local factory pending reconstruction.

H. Monroe Smith, 518 Patterson Avenue, Paterson, N. J., manufacturer of rubber machinery, and associates have organized Speed Control Corp., with headquarters at East Rutherford, N. J., to operate plant at last noted place for manufacture of electrical equipment and devices. Clifford M. Smith, Paterson, will be an officer of new company.

Clarence D. Chamberlain, Irons Atlantic, inventor, has purchased assets of Crescent Aircraft Corp., 372 Lombard Avenue, Jersey City, N. J., from A. Harry Moore, receiver, and will continue operation of

INDUSTRIAL CONSTRUCTION

Utility Projects Announced During Past Week Aggregate \$140,000,000

CURRENT projects, requiring machinery and equipment for their completion as well as extending utility projects which will run during the year, increased during the past week. The latter run well over \$140,000,000.

One of the largest items of forthcoming construction comprising this total is the budget of the North American Co. of New York, which will provide \$51,000,000 for expansion during 1931. This work will include the initial unit of a new steam operated electric generating plant at Port Washington, Wis., extensions to plant and equipment of Cleveland Electric Illuminating Co., at Ashtabula, Ohio, and similar extensions to the Bennington Station of the Potomac Electric Power Co., of Washington, D. C.

A natural gas pipe line construction project, involving \$6,000,000, is to be undertaken by Western Gas Co., of El Paso, Tex., for a new gas line from El Paso to Bisbee, Ariz., with a branch line to Cananea, Mexico.

Among railroad improvements is a new produce terminal for the Pennsylvania Railroad, to be built in Baltimore. Considerable material handling equipment is involved.

Industrial construction projects include a new canning plant at New Toronto, Ontario, for the Campbell Soup Co. The amount involved, including equipment, is \$750,000.

The summary of current projects for the week, which involve immediate action, is as follows:

Public utilities and power plants	\$1,650,000
Industrial plants	8,050,000
Metal working plants	1,500,000
Railroad improvements	200,000
Municipal improvements and airports	2,940,000
Total	\$14,340,000

In addition to the above, the total of extending utility projects announced during the week is \$140,792,000, natural gas and oil pipe lines, \$6,400,000, and school equipment and construction, \$3,430,000.

New England

South Atlantic

Philadelphia

capacity, including Tress-hov colliery, cost over \$75,000 with equipment.

Whipple Soap Co., Camden, N. J., operating Campbell Soap Co., Ltd., plans to open work this month on new building at New Toronto, Ont., where property was recently acquired. Its cost over \$200,000 with machinery.

State Board of Education, State House, Detroit, N. J., plans installation of pumping plant, Green-aid steel storage tank and other equipment in connection with new water supply and distribution system of school building on Lake Road, Ewing Township, Guilbert & Benson, 20 Hartford Place, Newark, N. J., architects.

Western Elevator Works, Inc., has been created in Lancaster, Pa., to take over business at one time operated under name of A. C. Welchans and later under name of A. C. Welchans Elevator Works, operation since 1882. An item appearing in Jan. 15 issue of THE IRON AGE announcing incorporation of this company have given impression that this is a new firm.

Detroit

CONTRACT has been let by Detroit Iron Foundry Co., Iron and Foundry Streets, Detroit, to C. O. Burton, 1000 East Jefferson Street, for a two-story foundry addition, 75 x 100 ft., to cost at \$100,000 with equipment. Work will include two casting pits, 22 x 170 ft. and two electric traveling cranes with cranes installed, and equipment for two sand type rooms, dust arresters, etc. Hugh Morton is president. Milner & Elson, Detroit Building, are architects.

Allison Motor Products, Inc., Allenton, Ill., recently organized by W. R. Kynard, Allenton, and associates, with capital of \$25,000, has taken over plant formerly occupied by Decker Screw Products Co., for production of valve lifters and kindred products. Mr. Kynard will be president. David P. Greenwalt is president, and E. C. Howard, secretary and treasurer.

Board of Education, Manistique, Mich., contemplates installation of manual training equipment in an addition to high school to cost close to \$200,000. R. A. Gray, St. Joseph, Mich., is architect.

Engels, Baum, 1241 Ransom Street, Michigan, Mich., and associates have acquired Inland Foundry Co. to operate a foundry for production of iron and other metal castings. Edward Meyer, Muskegon, is interested in new company.

Valley Chemical Co., Saginaw, Mich., manufacturer of industrial chemicals, is planning to rebuild part of plant recently destroyed by fire, with loss of about \$100,000 including equipment.

Ann Arbor Millwork Co., Ann Arbor, Mich., recently formed by Walter A. Seyler, Ann Arbor, and associates with capital of \$10,000, has purchased local plant of Lank Brothers & Co. for production of millwork products. Frank B. Gidyczek is one of heads of new organization.

Haywood-Walshfield Co., 2655 Armitage Avenue, Chicago, manufacturer of machinery, is arranging for removal of their chair manufacturing division from Chicago to Menominee, Mich., where its present facilities will be provided.

Buffalo

EXPANSION is being considered by Jamestown Metal Works Co., Inc., Jamestown, N. Y. Arrangements are being made for increase in capital from \$500,000 to \$1,000,000, primarily for such purpose.

New York State Electric & Gas Corp., Buffalo, N. Y., has applied for permission to take over Morton Power Co., including electric generating plant at Cheektowick, and plans extensions in that district, including transmission lines. Company is also attempting to take over plant and properties of Brockport City Light Co., Brockport, N. Y., and vicinity.

International Business Machines Corp., Elmsford, N. Y., will use new plant and new machine completion, totaling about 100,000 sq. ft. floor space, for new working and counting sub-subsidiary. Recently organized and equipment will be installed for parts assembling and other departments at once.

Electric-Alloys, Inc., care of Lake L. Milward, 187 LeBrain Road, Rochester, N. Y., president, recently organized by Mr. Milward and associates with capital of \$50,000 and 500 shares of common stock, contemplates erection of new plant at Buffalo for production of aluminum alloys and other metal alloys. Company has secured part of plant of Electric Industries Corp., Kellogg, near Buffalo, for initial operations. Among those interested in new company are Lewis W. Wheat, R. 22, Woodbridge Avenue, and Harry R. Deane, 30 Howard Place, Buffalo.

Reichelderfer & Electric Corp., Rochester, N. Y., has applied for permission to arrange for bond issue totaling \$200,000, of which about \$50,000 will be used for expansion and improvement of power plants and system during 1931. Company engineering department will be in charge.

New York Natural Gas Corp., Schenectady, N. Y., recently organized by Norval A. Francis, Red House, N. Y., and associates with capital of \$100,000, plans development of natural gas and oil properties in northern New York, including pipeline construction. Howard D. Yates, Bradford, Pa., is interested in new organization. E. J. Jones, Bradford, also, N. Y., is corporate representative.

Pittsburgh

BIDS are being asked by H. W. Evans, 1513 Secretary Board of Public Institutions, Administrative Building, Pittsburgh, until Feb. 11 for a metal chair to wood shapes and a rubber chair, cement and saw.

Perry-Jamestown Mfg. Co., Canal Street, Perry, Pa., manufacturer of steel cabinets and kindred products, is planning necessary addition for storage and distribution, to cost about \$25,000 with equipment.

Champion Iron Working Machine Co., Fifteenth and Bloomfield streets, Hoboken, N. J., has leased former plant of Modern Tool Co., Erie, Pa., and will remodel and convert to new location and machine capacity. It is expected to begin operations in new plant in March.

Leo E. Haller, 416 Washington Road, South Hills, Pittsburgh, and associates have organized Haller-Huth Sandblasting Corp., with capital of \$15,000, to operate local plant for production of aircraft and

armor. John S. Haller, chairman, noted, is interested in new company.

Board of Education, Apollo, Pa., plans installation of manual training equipment in new building and basement high school to cost about \$100,000 for which one year bond issue is already authorized. H. H. Rogers, 1000 West Third Building, Johnstown, Pa., is architect.

Plant in order way for reconstruction at Millers, 2001 Erie, Pa., manufacturer of tool chests, etc., and expansion will be carried out in cost close to \$50,000, hence part of time to be used for new equipment.

Armstrong-Bushnell Co., Elmira, N. Y., will carry out expansion and improvements at stone quarry at South Connelville, including installation of a new crusher and auxiliary equipment.

Cleveland

BIDS will soon be asked by Clayton Foundry Co., Elmira, Ohio, for a one-story foundry, 115 x 100 ft., with crane runway, to cost close to \$100,000 with equipment. Edward C. Hooper, 1000 Euclid Avenue, Cleveland, is architect and engineer.

Allison Tank Co., Alliance, Ohio, manufacturer of steel storage tanks, contemplates plant expansion and improvements early in spring. Company has recently been reorganized with J. P. Kohn, Youngstown, Ohio, formerly identified with Youngstown Boiler & Tank Co., as president, and J. L. Kohn, previously associated with Black Key Co., Pittsburgh, as vice-president and treasurer.

Stahlhut Parts, Inc., Toledo, Ohio, care of Marbo & Marbo, 10000 Harding, at Toledo, has been arranged to operate about 100 units of mechanical parts and equipment. H. H. Olson and C. E. Kolesars, principal incorporators.

Peckham Steel Corp., 1000 Avenue S. E., Canton, Ohio, has awarded general contract to A. F. Weindler Contracting Co., Massillon, Ohio, for extension and improvement of former plant of Canton Steel Sheet Co., recently acquired for a few weeks, to cost close to \$100,000 with equipment.

Sam O'Brien, 1000 Walnut Street, Philadelphia, has awarded general contract to H. J. Yokes Co., 1430 Euclid Avenue, Cleveland, for a tank oil storage and the following plant at Cleveland, including boiler plant and lubricating oil handling, to cost over \$5,000 with equipment.

Power equipment, conveying and other machinery will be installed in new three-story and basement plant, 100 x 150 ft., of Revere Lithographic & Printing Co., Electric Building, Cleveland, to cost \$140,000. W. M. Powell, Erie Building, is architect.

Goff's Tinsmith Foundry Co., Lima, Ohio, whose plant was recently destroyed by fire, has resumed operations at new works at Greenhouse Avenue and Erie Railroad.

Milwaukee

BOARD of Water Commissioners, Racine, Wis., will start work immediately on new Chicago pumping station and Rappahannock plant, originally planned for 1932 program. Alvord, Burdick & Howard, consulting engineers, 29 North Wacker Drive, Chicago, will complete plans so that contracts may be placed for

construction and equipment by early summer. Walter Peirce is secretary of construction.

Harnischfeger Corp., Milwaukee, has received order for one 200-ton electric traveling crane for installation in new power plant at Seattle. It will be turned out company has built.

Monroe County Board, Sports, Wis., has appropriated \$20,000 for erection and equipment of auditorium in County machine storage and service building at Sparta. George E. Goff is County highway commissioner.

A. W. Wright, village clerk, Wheatfield, Wis., is taking bids until Feb. 9 for one 125,000-gal. steel water storage tank.

Bucyrus-Erie Co., South Milwaukee, Wis., has acquired a controlling interest in Mountain Mfg. Co., Chicago, manufacturer of large drag lines and other excavating machinery, supplementing line of products manufactured by Bucyrus Erie Co.

Gulf States

PLANS are under way by Western Texas Co., El Paso, Tex., a subsidiary of the El Paso Natural Gas Co., for a bulk type 500,000 cu ft tank to receive and store. Also, with branch line to Comstock, Texas, for natural gas supply for various operations in Phillips Petroleum Co., El Paso, Texas. The tank will be 200 ft in diameter and will hold about 500,000 cu ft of gas. It will be built on a concrete foundation with a 10-in. steel shell. The tank will be built on a concrete foundation with a 10-in. steel shell. The tank will be built on a concrete foundation with a 10-in. steel shell.

General Texas Co., Houston, Tex., has announced a new one-story building, 72 x 80 ft, to cost over \$100,000 including foundation.

Brazos River Water Improvement District No. 1, Houston, Tex., H. G. Camp, engineer, is asking bids until Feb. 11 for three and half miles, with one 1000-gal. water storage tank and lifting one building for local water supply.

Fresno, Texas Co., Fresno, Tex., has secured oil rights on 700 acres near Union, Johnson Parish, La., and has decided for sulfur supply. Drilling machinery, conveying apparatus and other heavy equipment will be installed.

East Texas Pipe Line Co., Texas, Tex., is planning a pipe line for oil supply from Texas to Shreveport, La., with pump-out stations and other operating units. It will cost over \$200,000.

Central Industries, School District, Texas, plans construction of new three-story high school building, 100 x 100 ft, for which superstructure will soon be placed under way. Peirce, Strong & Bradshaw, Lubbock, Tex., are architects.

Central Power & Light Co., San Antonio, Tex., has plans for a hydroelectric generating plant on existing dam, and also for the El Guano River, near El Paso, Tex., which will have capacity of 10,000 hp. and to cost over \$2,000,000 with 20-mile transmission line. It is planned to begin work early in summer. Hiram Combs, Inc., 20 North Western Street, Chicago, is engineer.

City Council, Mercedes, Tex., has acquired property for a municipal airport and plans erection of hangar with repair shop, administration building and

other field units, to cost over \$70,000 with equipment.

International Aeronautical Industries, Inc., Miami, Fla., Henry L. Pierce, vice-president, affiliated with All-American Airways, Inc., Court House Road, and Miami Motor Rider Corp., Miami, has plans for new large city airport with remodeling and repair facilities. Later company plans erection of aircraft plant at same location, machine shops and other units, with facilities for an aviation school. Entire project will cost over \$2,000,000 with equipment. Charles P. Norder, Calumet Building, is architect.

William A. Siller, 2801 Mockbird Street, Dallas, Tex., is at head of project to erect an artificial manufacturing plant at Monroe, La., to cost close to \$2,000,000 with machinery.

Cincinnati

CONTRACT has been let by Covington & Cincinnati Bridge Co., Second and Greenup Streets, Covington, Ky., to Ferro Concrete Construction Co., Cincinnati, for three-story and basement automobile service, repair and garage building, to cost over \$125,000 with equipment.

Gulf Refining Co., Frick Annex, Pittsburgh, has asked bids on general contract for second group of buildings for new oil refinery at Cleveland, including treating plant, pumping station, control buildings and other structures, to cost over \$150,000 with equipment. Edward B. Lee, Chamber of Commerce Building, Pittsburgh, is architect.

Coca-Cola Bottling Works, Lebanon, Tenn., has awarded general contract to T. N. King Co., 335 Second Avenue South, Nashville, Tenn., for two-story bottling plant, 60 x 120 ft, to cost close to \$100,000 with equipment.

City Council, Johnson City, Tenn., is considering a bond issue of \$1,000,000, and to be used for erection of a municipal electric light and power plant. State Legislature, Nashville, is considering bill to provide for election on bond issue.

Rock and Refining Co., 227 West Main Street, Louisville, has acquired about eight acres near Hardysville, Ky., as site for new bulk oil storage and distributing plant, including pumping station and other units, to cost over \$50,000 with equipment.

Contracting Office, Wright Field, Dayton, Ohio, is taking bids until Feb. 17 for 140 propeller blades and until Feb. 21 for air-conditioning apparatus and refrigerated test room.

Champion Coated Paper Co., Hamilton, Ohio, has announced for a new preferred stock issue to total \$1,250,000, part of which is to be used for expansion.

Chicago

CAPITAL, Inc., 1000 North Dearborn St., Chicago, has announced for a new preferred stock issue to total \$1,250,000, part of which is to be used for expansion and improvements in power plants and system. Company is affiliated with local utility interests, same address.

Electric Rotary Machine Mfg. Co., Chicago, has been organized with capital of \$20,000 to take over and expand Electric Rotary Machine Co., 2346 West Lake Street, manufacturer of carpet-cleaning and other machinery. Incorporators in-

clude Edward B. Gruendel and Paul H. Hewitt.

Dewey Portland Cement Co., 1000 Building, Kansas City, Mo., is erecting a new river terminal at Buffalo, Mo., including dock, conveying, loading and other equipment to cost about \$150,000. It is expected to begin work early in summer.

Minneapolis-Honeywell Regulator Co., Fourth Avenue, South, Minneapolis, Minn., manufacturer of temperature control devices and equipment, regulators, etc., has purchased plant and business of Time Controls Co., Elkhart, Ind., manufacturer of kindred products, and will consolidate operating acquired company as a subsidiary. Minneapolis company is arranging for a new preferred stock issue of 100,000 shares, par value \$100, about 15,000 shares to be used for new acquisition, and part of other allotment for future expansion.

Rocky Mountain Refinery, Inc., Pueblo, Colo., plans construction of a new refinery on site recently purchased, to cost close to \$100,000 with machinery. Robert E. Stanton is company engineer in charge.

Great Northern Railway Co., Railroad Building, St. Paul, Minn., has asked bids on general contract for superstructure for a new steam-operated electric power plant at Williston, N. D., to cost about \$50,000 with machinery. Company has awarded general contract for superstructure for a similar plant at Great Falls, Mont., to Peppard & Fulton, Rossmore Building, Minneapolis, to cost close to like amount, and has also approved plans for a power plant at Whitefish, Mont., costing similar amount. T. D. McMahon is company architect.

St. Louis

BOND issue of \$27,000,000 is being sold by Kansas City Power & Light Co., Kansas City, Mo., part of proceeds to be used for expansion and improvements, including transmission lines.

Keystone Mfg. Co., 313 Hall Building, Kansas City, Mo., is planning installation of equipment in spring for production of registering devices and equipment for oil and gasoline, including precision equipment for parts and assembling.

Board of Public Utilities, Kansas City, Mo., has asked bids on general contract for a one and two-story power plant, 50 x 125 ft., to cost over \$100,000 with machinery. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is engineer.

Crystal Ice Co., 1201 North Third Street, St. Louis, has awarded general contract to A. H. Stiel, 813 Chestnut Street, for a one and two-story ice-manufacturing plant, 60 x 120 ft., to cost about \$85,000 with equipment. Headquarters are at Omaha, Neb.

Schullin Steel Co., 6700 Manchester Avenue, St. Louis, is planning establishment of division for manufacture of steel building materials for home construction, including steel frames, walls, sash, etc., to be welded on site.

City Council, Pawhuska, Okla., is planning extensions and improvements in municipal electric light and power plant, including installation of a 600-hp. Diesel engine unit and auxiliary equipment.

Common Council, Chickasha, Okla., plans installation of pumping machinery and power equipment in connection with extensions and betterments in municipal

waterworks, for which a bond issue of \$193,000 has been approved.

Board of Education, City Hall, Omaha, Neb., plans installation of manual training equipment in new three-story and basement high school addition to cost \$230,000, for which bids have been asked on general contract. John Latenser & Sons, Peters Trust Building, are architects.

R. B. Fremont, 1340 West Fifth Street, Oklahoma City, Okla., and associates have organized Fremont Foundry & Valve Works, with capital of \$150,000, and will operate local plant for manufacture of castings and other equipment for oil fields.

Board of Education, Topeka, Kan., plans installation of manual training equipment in new five-unit senior high school on Tenth Street, now under way, to cost \$1,000,000. Thomas W. Williamson, Farmers' National Bank Building, is architect.

Arkansas Valley Gas Co., Arkansas City, Kan., is considering construction of a natural gas pipe line from Mansfield, Ark., to DeQueen, Ark., to cost over \$350,000 with compressor stations and other structures.

Indiana

POWER equipment, conveying and other machinery will be installed in two one-story storage and distributing plants to be erected by Reid-Murdock Co., 314 North Clark Street, Chicago, food products, near Pierceton, 100 x 250 ft., and 50 x 100 ft., to cost about \$70,000. Edgar O. Blake, Evanston, Ill., is architect.

Universal Gear Corp., Indianapolis, has recently secured space in Indianapolis Industrial Center, Nineteenth Street and Martindale Avenue, for an assembling plant.

Contract has been let by Art Fleck, Union Title Building, Indianapolis, architect, to Thomas A. Moynahan Construction Co., Union Title Building, for a three-story automobile service, repair and garage building, 120 x 150 ft., at Fort Wayne, to cost about \$200,000 with equipment.

Robert C. Winslow, 3224 North Pennsylvania Street, Indianapolis, and associates have organized Petroleum Marketers' Equipment Co., to operate a plant for manufacture of tanks, measuring equipment and devices for oil and gasoline. Joseph J. Egan, Indianapolis, will be an official of company.

Board of Trustees, Plainfield, contemplates installation of pumping machinery and other equipment for expansion and improvements at municipal waterworks. A 150,000-gal. steel tank will be installed. Bids will soon be asked on general contract.

Wells Saw Repair, Inc., Indianapolis, care of Donald M. Ream, Merchants Bank Building, attorney, recently organized by William Wells, Indianapolis, and associates, plans operation of machine shop. M. N. Smock, Indianapolis, is one of incorporators of company.

National Battery Co., 1728 Roblyn Avenue, St. Paul, Minn., has plans for a one-story factory branch, service and repair works at Evansville, to cost close to \$50,000 with equipment. A. E. Neucks, Old State Bank Building, is architect.

Noblitt-Sparks Co., Greenwood, manufacturer of steel tubing for bicycles, motorcycles, etc., has resumed part-time

operations. Plant had been practically idle for last 30 days.

Contracts for more than \$700,000 have been awarded to Ertel Machine Co., Indianapolis, and plans for increasing operating schedules to capacity are under way.

Capacity production in all plants of Auburn Automobile Co., Auburn, will be reached by Feb. 19, according to R. H. Faulkner, vice-president. Demand for 1931 models has exceeded expectations and orders to date are running ahead of those of 1929, record year for company. Scheduled production at Connersville plant during February calls for at least 4000 finished cars. All departments at this plant are working full six days a week, with body and stamping departments working Sundays and night shifts.

Pacific Coast

FUND of \$13,234,452 has been authorized by San Joaquin Light & Power Corp., Fresno, Cal., for extensions and improvements in power plants and systems, including new steam-operated electric generating plant at Herndon, on San Joaquin River, and new transmission line. About \$1,000,000 will be used for expansion of natural gas system, including new pipe lines and compressor stations. Company is an interest of Pacific Gas & Electric Co., 245 Market Street, San Francisco, which is disposing of a new bond issue of \$25,000,000, part of fund to be used for expansion and betterments in properties.

Western Automatic Sprinkler Co., 114 Sansome Street, San Francisco, manufacturer of fire sprinkler systems and devices, a subsidiary of Viking Corp., Hastings, Mich., has changed its name to Viking Automatic Sprinkler Co. Company has become affiliated with Northwestern Sprinkler Co., Seattle, which likewise has changed its name to Viking Automatic Sprinkler Co. Consolidated organization plans general expansion, including development of new devices for automatic sprinkling service. G. W. Greeley is local manager at San Francisco.

Liquid Sugar Corp., 637 Battery Street, San Francisco, has plans for a new mill at San Jose, Cal., to cost about \$100,000 including machinery. Company engineering department will be in charge.

Saf-T-Pak Miller Corp., Los Angeles, has engaged engineering department of Central Mfg. District, 4811 Loma Vista Street, to prepare plans for new one-story factory, totalling about 40,000 sq. ft. floor space, for manufacture of composition products, to cost close to \$70,000 with equipment.

Board of Education, Chamber of Commerce Building, Los Angeles, has asked bids on general contract for additions at Alexander Hamilton School, including a nine-room vocational shop unit, 78 x 150 ft., entire project to cost about \$400,000. John C. Austin and Frederic M. Ashley, Chamber of Commerce Building, are architects.

Oregon Brass Works, Inc., Portland, has awarded general contract to Wegman & Son, Board of Trade Building, for one-story plant on local site recently acquired, to cost about \$40,000 with equipment. Company has recently sold its present foundry on Linton Road to Magnus Co., for production of brass specialties for railroads, and Oregon company will concentrate manufacture at new plant. Sut-

ton & Whitney, Lewis Building, are architects.

Puget Sound Power & Light Co., Seattle, is planning plant extensions and improvements in Snohomish and neighboring counties, to cost about \$500,000 including steel tower transmission line from summit of Cascade Mountains to Snohomish and vicinity. Company engineering department is in charge.

Canada

A SUBSTATION will be built by Hydro Electric System, 12 King Street East, Hamilton, Ont., in southern part of city, to cost \$25,000. Equipment costing \$125,000 will be installed. E. J. Sifton is engineer.

Westport, Ont., will install power plant and is in market for equipment to cost \$15,000. W. S. Ripley is clerk.

Public Utilities Commission, 524 Dundas Street, Woodstock, Ont., contemplates purchase of a large oil burning internal combustion engine as auxiliary equipment for power plant.

Northwestern Power Co., Ltd., Winnipeg Electric Railway Chambers, Winnipeg, is considering erection of a substation, construction to start in spring.

Municipal Council, Deux Rivières Village, Que., will spend \$40,000 on installation of waterworks plant, for which equipment will be purchased. J. T. Jacob, St. Stanislas de Champlain, Que., is secretary-treasurer.

Tenders are being received by John Peebles, mayor City Hall, Hamilton, Ont., until March 5 for supply and installation of four low-lift and two wash water pumps, until Feb. 19 for 12 36 x 42-in. and 12 24 x 24-in. hydraulically operated penstocks, four 48 x 72-in. and three 72 x 72-in. hand-operated penstocks.

Improvements and installation of two sewage disposal plants at Lindsay, Ont., to cost \$100,000, will be extended over five year period. Immediate plans call for expenditure of \$25,000 on relief sewers and installation of two electric pumps. Oliver Smith is engineer.

Foreign

BIDS are being asked by general manager of New Zealand Government Railways, Wellington, New Zealand, until April 9 for armored cable, transformers, instruments, cable boxes and other electrical equipment for railroad electrification; until April 14 for transformers of 45,333 kva. capacity, spare parts, etc., and until May 5 for outdoor switchgear and kindred equipment for railroad electrification.

International Public Service Corp., 27 William Street, New York, an interest of J. G. White & Co., 37 Wall Street, New York, has purchased controlling interest in Novisad Electric Co., Novisad, Yugoslavia, and has negotiations under way for acquisition of similar central station properties in Subotitza and other adjoining territory. It is proposed to consolidate different interests under one management and develop additional power station facilities and transmission lines. Federal Water Service Co., 27 William Street, is also interested in International corporation.

Administrative Board, German State Railways, Berlin, Germany, has secured a

fund of 50,000,000 m. (about \$12,000,000) for an electrification program for part of lines, and work will begin soon on such improvement on Augsburg-Stuttgart line. Allgemeine Elektrische Gesellschaft (General Electric Co.) and Siemens-Schuckert, both of Berlin, are interested in project.

A company is being formed under direction of Lithuanian Government, Riga, Latvia, to construct and operate a coal-mining refinery with initial capacity for 100,000 tons of coal. Plans for such a plant, for which plans will soon be drawn, require information at office of Bureau of Foreign and Domestic Commerce, Washington, reference Lithuanian No. 82-717.

James Koenig, Denver, former president of Continental Oil Co., Denver, and Hope Gasoline Co., Mount Vernon, Ohio, has acquired a controlling interest of North Kansas Oil Corporation, of Lawrence, Kan., and is planning to develop oil properties in Province of Saskatchewan, Bismarck and Metchen, Sask.

Germany: With total holdings of over 1,000,000 acres of oil lands. Purchasing interests plan development for crude oil production, including construction of storage and distributing plants, pipe lines and other structures. Byron K. Helper, vice-president of this company, is interested in project with Mr. Koenig.

New Trade Publications

Wires and Cables.—General Cable Corp., 120 Lexington Avenue, New York. An illustrated booklet of 16 pages describes Alstro which this company recently introduced. The material is offered in the form of insulated aluminum wires and cables with necessary fittings.

Band Planer and Jointer.—Oliver Machinery Co., Grand Rapids, Mich. Oliver has introduced new line of built-in band planers and jointers, which are built in 6-in., 8-in. and 12-in.

sizes, and will handle work up to 10-in. full rated capacity, with the fan either square or tilted to 45 deg. Low tables are one of the features of these machines.

Coating Tanks.—H. O. Swoboda, Inc., 3400 Forbes Street, Pittsburgh. Bulletin No. 200 of seven pages describes the Falcon electrically-heated vertical large coating tanks for asphalt, tar, compounds, oils, varnishes and similar substances.

Thread-Cutting Machinery.—Lanark Machine Co., Inc., Waynesboro, Pa. Ten-page bulletin describing slitting, any pipe, casing, drill pipe, line pipe and tubing die heads. These dies are used on Lanark pipe-threading and cutting-off machines, and can be applied also to other makes of pipe machines.

Pumps and Compressors.—Worthington Pump & Machinery Corp., Hartford, Conn. N. J. Illustrated bulletin L-1000-B, pointing out the characteristics and advantages of the Multi-V drive.

Machinery Exports in 1930 Exceeded Only by Those of 1929

WASHINGTON, Jan. 31.—Exports of machinery from the United States in December aggregated \$36,231,461, against \$33,101,479 in November. December shipments to foreign markets were the largest since last July, when they totaled \$38,007,000. Exports in December, 1929, totaled \$49,536,122.

For the calendar year exports, amounting to \$520,639,212, were \$90,858,593 less than those in 1929, aggregating \$611,497,805. Except for 1929, exports in 1930 were much the largest on record, exceeding 1928, itself the highest to that time, by 4% per cent.

Exports of machinery and vehicles in December of last year were valued at \$53,468,385, compared with \$78,601,553 of the previous year. For the year they aggregated \$823,463,079, compared with \$1,200,761,887 in 1929. The declines of last year were due largely to reduced shipments of automobiles and other vehicles.

Exports of industrial machinery in December were valued at \$13,093,368, compared with \$20,989,421 in December, 1929. In 1930 they aggregated \$228,287,559, against \$267,819,385 in 1929.

Imports of machinery in December declined to \$1,245,090 from \$1,307,198 in the previous month, and \$2,536,065 in December, 1929. In 1930 they slumped to \$24,205,162 for 12 months from \$31,854,348 in the previous year.

Imports of Machinery into the United States
(By Value)

	December		12 Months Ended December	
	1930	1929	1930	1929
Metal-working machinery tools	\$22,367	\$124,915	\$991,300	\$1,459,053
Agricultural machinery and implements	161,560	1,229,486	8,545,336	9,544,509
Electrical machinery and apparatus	220,757	118,934	2,918,402	2,664,169
Other power-generating machinery	21,329	21,025	549,323	1,113,261
Other machinery	592,361	812,236	8,901,483	11,921,948
Vehicles, except agricultural	125,816	220,469	2,389,318	5,151,408
Total	\$1,245,090	\$2,536,065	\$24,205,162	\$31,854,348

Machinery Exports from the United States
(By Value in Thousands of Dollars)

	December		12 Months Ended December	
	1930	1929	1930	1929
Locomotives	851	\$730	\$673	\$4,767
Other steam engines	89	99	618	781
Boilers	17	211	1,242	2,086
Accessories and parts	99	153	867	1,071
Automobile engines	109	178	4,626	10,216
Other internal combustion engines	425	688	7,669	10,161
Accessories and parts	171	276	3,329	4,265
Electric locomotives	397	179	1,602	1,121
Other electric machinery and apparatus	648	1,188	10,641	13,474
Excavating machinery	403	672	9,101	8,221
Concrete mixers	31	76	844	1,402
Road-making machinery	147	144	3,764	3,139
Elevators and elevator machinery	233	413	4,806	5,479
Mining and quarrying machinery	1,417	1,140	15,784	17,946
Oil-well machinery	1,298	2,002	22,817	25,004
Pumps	491	829	8,944	11,490
Heating and power processes	486	260	4,619	3,330
Forcing machinery	45	161	1,847	1,764
Machine tools	2,129	2,130	26,973	28,087
Rolling machines	113	119	1,187	1,658
Other metal-working machinery and parts	547	513	6,516	7,365
Textile machinery	536	1,390	8,660	13,657
Sewing machines	374	777	6,771	10,325
Shoe machinery	416	188	1,678	1,988
Flour-mill and grain-mill machinery	49	78	478	686
Sugar-mill machinery	192	157	4,316	4,437
Paper and pulp-mill machinery	187	183	3,511	3,917
Sawmill machinery	89	78	758	941
Other woodworking machinery	165	298	1,776	2,522
Refrigerating and ice-making machinery	291	782	4,112	14,079
Air compressors	282	463	5,605	7,590
Typewriters	1,042	1,432	16,683	22,844
Power laundry machinery	174	117	1,440	2,033
Typesetting machines	340	450	3,960	5,770
Printing presses	175	416	4,836	6,472
Agricultural machinery and implements	8,329	12,273	115,792	140,801
All other machinery and parts	14,298	18,223	201,093	216,709
Total	\$36,231	\$49,536	\$520,639	\$611,498

Continental Steel Prices Decline With Export Trade Dull

(By Cable)

LONDON, ENGLAND, Feb. 2.

THE pig iron market is slightly improved, with domestic consumers purchasing more freely, and inquiring for deliveries over the next three months.

Continental pig iron is no longer competitive in the Middlesbrough district, but considerable quantities are still due under old contracts. Cleveland furnace stocks of iron are heavy and furnaces are able to meet all requirements.

Canada has ordered two oil tank ships from Tees shipyards, but otherwise shipbuilding is extremely quiet and steel mills are in great need of orders. Dorman, Long & Co. have blown in one Middlesbrough furnace, but business is generally poor and no improvement is in sight.

Continental prices are declining in the absence of substantial demand. Mild steel bars have sold at £3 19s. a ton (0.86c. a lb.), and even lower prices are reported. These are exceptional, however, most mills adhering to £4 a ton (0.88c. a lb.), f.o.b.

Tin plate inquiry is broadening, especially from the Far East, but many mills are still idle. Prices vary widely, depending upon the situation of particular sellers.

Galvanized sheets are inactive. The Indian Legislative Assembly has endorsed the Tariff Board's proposals for increase in the duty on galvanized sheets. The new import duty is 37 rupees (\$13.28), but permission has

United Steel Works, Dusseldorf, Germany, seeks 20 per cent wage reduction.

* * *

British engineering company books order from Pittsburgh steel mill for tube machinery.

* * *

Jugoslavian Government to build a \$16,000,000 steel plant.

* * *

German manufacturer finds 2000-year-old steel ingots make good cutlery.

been granted for the period ending March, 1932, only, instead of for a three-year period, ending March, 1934, as originally requested. Black sheets are quiet.

The Wellman, Smith, Owen Engineering Corp. has secured a contract for 1000 tons of weldless steel tube machinery for a Pittsburgh company.

The Nelson Line has placed an order with Harland, Wolff & Co. for a 14,000-ton motor vessel to replace the ship wrecked last year.

British rationalization is continuing with John Brown & Co. and Thomas Firth & Sons proposing a closer working arrangement. The present plan is for John Brown & Co. to transfer the Atlas and Scanthorpe works and certain other assets to Thomas Firth & Sons against a mort-

gage of £600,000 (\$2,316,000) at 6 per cent, in favor of the debenture bond holders of John Brown & Co. For the other assets, Thomas Firth & Sons will allot 450,000 fully paid ordinary £1 (\$4.86) shares to the shareholders of John Brown & Co.

Italian output last year was 534,000 tons of pig iron and 1,774,000 tons of raw steel.

Polish output in 1930 was 478,000 tons of pig iron, 1,237,000 tons of raw steel and 825,000 tons of rolled steel.

The Saar production in December was 145,000 tons of pig iron and 149,000 tons of raw steel, making the year's totals 1,912,000 tons of pig iron, 1,935,000 tons of raw steel and 1,413,000 tons of rolled steel.

German Company Forges Pre-Roman Steel

HAMBURG, GERMANY, Jan. 19.—Recently experiments have been conducted by J. A. Henckels, Solingen, in forging and hardening old pre-Roman steel ingots of the La Tene period, 800 to 200 B. C. Some 350 of these ingots, weighing 10 to 20 kg. (22 to 44 lb.) have been excavated in Germany. The ingots are low in sulphur and phosphorus, but contain a considerable percentage of slag. The usual analysis is 0.44 per cent C, 0.065 per cent Si, 0.10 per cent Mn, 0.043 per cent P, 0.012 per cent S, and 0.005 per cent Cu.

Although the slag content of this

British and Continental European Export Prices per gross ton, f. o. b. United Kingdom Ports, Hamburg and Antwerp with the £ at \$4.8665 (par)

British Prices f. o. b. United Kingdom Ports

Pig iron, export, 19 08, to 111 58	\$43.74 to \$51.72
Pig iron, open-hearth, 19 10, to 6 24	26.76 to 29.88
Black sheets, Japanese specifications, 11 10, to 13 14	55.95 to 58.00
Tin plate, per base box, 0 13 1/2, to 0 15 1/2	5.74 to 6.50
Steel bars, open-hearth, 2 15, to 8 7	1.69 to 1.79
Beams, open-hearth, 2 15 1/2, to 7 12 1/2	1.69 to 1.71
Channels, open-hearth, 1 12 1/2, to 8 12 1/2	1.88 to 1.87
Angles, open-hearth, 2 7 1/2, to 7 17 1/2	1.60 to 1.71
Black sheets, No. 24 gage, 8 10, to 11 0	1.84 to 2.12
Galvanized sheets, No. 24 gage, 11 0, to 12 12 1/2	2.12 to 2.40

Continental Prices, f. o. b. Antwerp or Hamburg

Foundry iron, 2.50 to 5.00 per cent sil., 1.00 per cent and more phosphorus, 12 12 1/2, to 12 15 1/2	\$12.04 to \$12.80
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Wires, Thomas (nominal), 1 12 1/2, to 12 15 1/2	\$17.51 to \$17.76
Wires, low C, No. 8, 2 1/2, to 2 7 1/2	24.94 to 26.15
Wires, low C, No. 10, 3 0, to 3 10	29.20 to 30.41
Black sheets, No. 24 gage, Japanese, 11 10, to 13 14	55.95 to 58.00
Steel bars, merchant, 2 15, to 8 7	1.69 to 1.79
Beams, Thomas, British standard (nominal), 2 15 1/2, to 7 12 1/2	1.69 to 1.71
Channels, Thomas, British standard (nominal), 1 12 1/2, to 8 12 1/2	1.88 to 1.87
Angles, Thomas, 2 7 1/2, to 7 17 1/2	1.60 to 1.71
Black sheets, No. 24 gage, 8 10, to 11 0	1.84 to 2.12
Galvanized sheets, No. 24 gage, 11 0, to 12 12 1/2	2.12 to 2.40
Wires, low C, No. 8, 2 1/2, to 2 7 1/2	24.94 to 26.15
Wires, low C, No. 10, 3 0, to 3 10	29.20 to 30.41
Wires, low C, No. 12, 3 1/2, to 3 15 1/2	34.41 to 35.62

steel is high, it can be forged and ground into excellent quality cutlery. At the Henckels plant a bar was heated to a white heat and hand forged by a skilled operative. Because of the excess of slag, there was an inclination to forging splits, so that the waste of material was considerable. The cutlery successfully forged, however, was of high quality. It was concluded by the Henckels company that manufacture of weapons by the pre-Roman makers of these ingots was difficult, and that they must have had great skill as craftsmen to have forged products from such material.

United Steel Works Output Off in Last Quarter

DUSSELDORF, Germany, Jan. 20.—The report of the Vereinigte Stahlwerke A. G. (United Steel Works) for the last quarter of 1930, which has just been made public, shows a decline in pig iron output to 947,788 metric tons from 1,080,762 tons in the third quarter, and a decline in steel making to 1,006,553 tons, compared with 1,083,101 tons in the third quarter.

The total number of operatives employed by the company was 120,954 at the end of 1930, which was 53,000 lower than at the end of 1929. Orders on books Dec. 30 were only 59.8 per cent of the total unfilled tonnage at the end of 1929. The value of all orders executed in the final quarter of the year was 231,400,000 m. (\$55,073,200), compared with 276,400,000 m. (\$65,783,200) in the third quarter.

Jugoslavia Is to Build a \$16,000,000 Steel Plant

HAMBURG, GERMANY, Jan. 21.—Following negotiations over the past two years with American and European companies, the Government of Yugoslavia has decided to establish a steel industry, which is expected to eventually make the country self-supplying. The greater part of the contract for construction of a steel plant to cost about \$16,000,000 has

been awarded to the Wittkowitz Eisen und Stahlwerke in Czechoslovakia.

Plans call for two blast furnaces, open-hearth furnaces, Bessemer converters, and rolling mills for production of bars, shapes and plates. The new plant is expected to be completed for operation in about 18 months. The Wittkowitz works is understood to have agreed to buy a part of the Yugoslavian iron ore production for the next 10 to 20 years, as the country has a large iron ore supply, but very little coal. As a high tariff will probably be placed on iron and steel products by Yugoslavia to protect the new industry, Austrian, Hungarian and Czechoslovakian steel producers will be affected by this new development.

Chicago Employment Down in December

Total number of employed and the aggregate payroll in both manufacturing and non-manufacturing lines reporting to the Federal Reserve Bank of Chicago was slightly less at the middle of December than a month previous. Of the 14 groups included in the survey, six manufacturing and two non-manufacturing groups employed fewer men in December than in November.

The industrial group of metals and products showed a gain of 1.4 per cent in wage earners and a decline of 0.6 per cent in payroll. The vehicle group experienced a loss of 1.1 per cent in wage earners, and a loss of 3 per cent in earnings. Construction fell off 19.4 per cent and earnings 26.6 per cent as of the week of Dec. 15, 1930, compared with Nov. 15.

Airports in the United States, of which there were 1113 on Jan. 1, 1931, represent a capital investment of \$115,068,500, according to a survey made by the Aeronautics Branch of the Department of Commerce. These airports are proceeding with plans for improvements calling for further expenditures of about \$20,000,000.

German Steel Company Seeks Wage Reduction

(By Radio)

BERLIN, GERMANY, Feb. 2.

UNFILLED tonnage of the United Steel Works, Düsseldorf, is 10 per cent below the average in 1929, and the company is seeking a reduction in wages of 20 per cent.

The reduction in domestic steel prices by the Raw Steel Syndicate in January brought a slight increase in the volume of new business, and imports from Belgium have declined.

With the exception of continued business with Denmark, Sweden and Brazil, export trade has declined and export prices are 2 to 4 m. (48c. to 96c.) a ton lower than in December.

Following the reduction of domestic prices, the steel syndicate reduced its price rebates to exporting manufacturers.

Steel ingot production in Germany in 1930 was 11,538,600 tons, compared with 16,246,100 tons in 1929.

Symposium on Malleable Iron Castings

At the annual meeting of the American Society for Testing Materials, to be held at the Hotel Stevens in Chicago, June 22 to 26, a symposium on malleable iron castings will be a feature. It is sponsored jointly by the American Foundrymen's Association and the A. S. T. M.

The symposium will be divided into two parts, the first being the submission of data on the properties of malleable iron castings, including physical constants, mechanical properties, and electric and magnetic properties as well as microstructure, machinability and the effect of heat treatment. The second part will be taken up with the presentation of several technical papers.

The main symposium of the annual convention will be on the effect of temperature on the properties of metals under the joint sponsorship of the American Society of Mechanical Engineers and the A. S. T. M.

Primary Production of Zinc in the United States

(From United States Department of Commerce)

(Net Tons)

	Jan.	Feb.	March	April	May	June	Half-Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1917	62,785	55,593	65,929	63,031	64,680	59,399	371,417	57,677	54,960	50,599	53,493	50,113	48,149	314,991	686,408
1918	39,896	43,624	53,818	42,504	40,039	47,513	267,394	40,033	49,610	40,433	39,687	48,609	42,079	260,451	527,845
1919 (a)	41,958	39,244	44,813	40,848	41,012	40,818	248,693	37,412	38,393	34,686	34,890	37,358	34,311	217,050	465,748
1920	43,439	43,923	48,256	45,399	45,413	41,009	267,439	40,194	38,228	36,819	35,335	33,318	28,439	212,333	479,772
1921	25,916	17,769	15,739	16,552	18,026	19,443	113,445	15,495	14,621	14,367	14,539	21,134	22,013	102,169	215,614
1922	23,706	22,513	26,532	25,506	27,419	28,547	154,223	31,919	31,423	33,135	39,939	40,200	42,839	219,455	373,678
1923	46,317	42,443	48,731	46,866	47,348	42,839	274,544	43,065	41,625	39,105	42,098	44,280	46,485	256,658	531,292
1924	49,799	43,933	47,775	44,949	47,666	43,442	277,474	42,913	41,775	40,852	42,488	42,633	47,711	258,372	535,846
1925	50,386	46,811	51,485	48,851	49,739	45,921	293,193	47,583	47,849	47,384	50,497	50,629	53,794	297,736	590,929
1926	56,389	53,239	54,411	53,334	53,793	48,226	319,392	48,403	51,761	52,144	54,979	55,062	56,884	319,233	638,565
1927	56,898	51,341	56,546	51,626	51,296	49,718	317,425	47,627	49,012	47,735	50,185	49,217	52,347	296,123	613,548
1928	52,414	50,042	55,881	53,493	53,422	50,825	316,077	50,890	52,157	49,361	50,259	50,260	50,591	303,518	619,595
1929	50,501	47,733	55,008	55,203	57,475	52,532	318,452	54,447	55,708	51,994	54,513	48,411	47,292	312,365	630,817
1930	52,026	44,645	48,139	44,450	44,578	43,473	277,311	40,039	41,029	40,485	40,939	31,977	.....	226,400 (b)	503,709

(a) No monthly data were gathered for 1919. These figures were estimated by THE IRON AGE, from the annual total, on basis of each month bearing the same share of the total as did the average of the corresponding months of 1917, 1918, 1920 and 1921.

(b) With December estimated.

Making Corrosion-Resisting Sheets With Polished Surface

(Concluded from page 460)

After pickling, sheets are taken through the scrubbing machine, which is placed in the doorway between the receiving wing and the new building equipped for cold-rolling, leveling, shearing, etc. Polishing facilities will later be removed to this building, which is provided also with a railroad siding for shipping.

Three stands of cold rolls are provided and two roller levelers, from which sheets go to the shears and stretcher levelers. One photograph illustrates the great care required in handling the finished sheets prior to packing and shipping. Inspection must be very rigid, also, and is accomplished with the polishing operation at the other end of the mill. Further inspection is sometimes necessary when oiling and packing. Probably as much care is taken in turning out these sheets in perfect condition as in the ultimate fabrication of the finished product.

Alloy Steels and Irons—Bright Spot on the Horizon

(Concluded from page 451)

are outstanding examples of this step forward in modern architecture. This trim is absolutely resistant to rust, atmospheric corrosion or oxidation, has a high, imperishable polish, and also is very strong. By using this, it is possible to eliminate many tons of stonework and masonry and at the same time present a lasting and beautiful finish to the building. Other proportions of chrome and nickel are used in corrosion-resisting steels where a satiny finish is not necessary or desirable. Pumps, piping, and valves in mines, oil fields, and chemical plants are of this material when certain corrosive liquids are handled.

The ability of "18-8" chrome-nickel steels and irons to withstand corrosion from salt water and spray has led to their extensive use in marine work. Fittings and parts that were formerly made of copper or bronze, or else were allowed to tarnish, are now fabricated from this alloy. As a result, cleaning of these fittings is no more difficult than polishing glass. In fact, it is done in the same manner.

Dipper teeth, drills, mine car coupler pins, crusher parts, etc., which are subjected to sudden shock are being fabricated from manganese steel. This type of material becomes harder and tougher upon being cold worked, so it is particularly well adapted for use where the part encounters repeated loads which develop high fatigue stresses.

All these alloys, with their extensive field of applications, have been developed with but one aim in view—economy. The elimination of dead weight allows the fabrication of lighter and stronger parts. Transportation, installation, maintenance costs are reduced so that, in the long run, the over-all expenses are lowered. Resistance to corrosion, abrasion, shock, etc., lead to longer life and greater length of uninter-

rupted service, a factor of prime importance in this age of mass production.

And these fields have hardly been touched. Every day new applications are discovered that will increase the dependability of performance of some new piece of apparatus, either in part or in its entirety. Eventually, all-metal airplanes of alloy materials, all alloy-steel locomotives, automobiles, engines, and structures will be as commonplace as these of low-carbon steel are today.

Alloy steels are not new, and yet the myriad of uses to which the various types of alloys are put are the newest of ideas, and are but forerunners of the innumerable applications which are not as yet born. This age is one embodying some of the greatest advancements that the world has ever known. Alloy steels have played a most important part in making industrial history; but compared to what is before us in this field, the surface of which is but scratched, they have scarcely begun their growth. Where the trend is toward lighter, stronger, more durable structures, alloy steels will play even a more important part than they have in the past.

Russia Still Offers Large Market for American Equipment

(Concluded from page 478)

Pavlovo, near Nizhni Novgorod, for the manufacture of automobile and tractor accessories.

All plants now under construction are scheduled for completion by the end of the five-year period, that is by 1933. In the succeeding period the volume of construction will no doubt be still greater since the Five-Year Plan is only a first step in the country's economic development. Construction programs of similar scope to those partially outlined above for the metal and machine-building industries are under way in the oil, coal, chemical, transportation, electrotechnical, power and other industries. All of these projects require great quantities of machinery and equipment, much of which will have to be purchased abroad. In spite of the great increase in Soviet purchases in this country, which has resulted in the United States becoming the leading exporter to the U. S. S. R., it may truly be said that the Soviet market has barely been scratched.

Corrosion of Copper Steel

DURING the rusting of copper steels, concentrations of copper on the surface were noticed, says C. Carius in an article in *Zeitschrift für Metallkunde*, October, 1930, pages 337 to 341, entitled "Information on the Corrosion Process during the Corrosion of Copper Steel."

The various forms of these copper concentrations—adherent copper precipitates during rusting in distilled water, powdery copper sponge in salt solutions—had a marked influence on the process of rusting. Oxidation-reduction couples and their effect on rusting are discussed. By a comparison of the oxidation potential of an aqueous medium with the position of the potential of a metal toward that reagent, the attackability of the metal may be forecast.

Business as Others View It

Digest of Current Financial and
Economic Opinion

A SPRAG in the wheels of commerce is the current characterization of what *Financial Chronicle* calls "new difficulties destined to delay the period of recovery, and, indeed, to postpone its coming indefinitely." Reference is to what other papers designate as a "raid on the United States Treasury," in connection with the demand for immediate payment of \$3,100,000,000 veterans' certificates—due in 1945. "Its inherently dangerous character and the manifold possibilities of ill effects in so many different directions," thinks the *Chronicle*, have dealt the financial markets "a blow which has been as serious as it was unexpected."

Earnest hopes are expressed by *Analyst* "that the business community... will not again be called upon to withstand further shocks as severe." And it calls this bonus activity in Congress "the worst setback which business sentiment has received" during the week.

Better Conditions Seen Near

A more encouraging psychology is noted elsewhere. Both *Commerce* and *Finance* and Silberling stress it. As the former has it: "Replacement requirements will prevent any further decline in pro-

duction and, according to all precedent, recovery of stock and commodity prices should coincide with an increase in trade." Even now, says that paper, "a veritable bal-lyhoo chorus of business revival has arisen."

Silberling has us looking to the "possibilities ahead rather than the wreckage behind." The warning is sounded, however, that the year during which general business activity reaches a major bottom level, after a severe recession, has always averaged lower than the preceding year; the decline is always more rapid than the recovery. But the year following the bottom year tends to be very much above the bottom year—it has "a surprising expansion." This bouquet appears to be thrown at 1932.

Financial Decks Well Cleared

Liquidation in the banking business is reported by Harvard Economic Society to be far advanced. Contraction of collateral loans has been heavy since Oct. 1. Deposits expanded a billion dollars while loans were being reduced by half that amount. And there has been a substantial expansion in banking reserves.

These developments are pointed to as evidence that the readjustments accompanying depression are

nearing completion, and are favorable to recovery in business. Past experience points to termination of business decline "probably in the present quarter, and indicates that the ensuing recovery will not be long delayed."

Considerable headway in "correcting the unfavorable features inherited from the boom period" is seen by First National Bank, Boston, inventories in many lines having been "appreciably reduced."

Inter-acting World Economic Forces

A retarding factor, operating against world business recovery, is noted by that institution. "While politics governing world trade have become more national, the economic system has become more international in its ramifications. The more advanced the capitalistic system becomes, the more specialized and mutually dependent its component parts, and the greater the need for reciprocity."

Our interests have become so far flung and so sensitive to world conditions that "domestic economic autonomy is no longer possible without going back to more primitive conditions. . . . We cannot detach ourselves from the world economic organism, of which we are a chief and integral part."

New Trade Publications

Industrial Railways.—American Chat & Ponder Co., 39 Church Street, New York. Bulletin 101, containing data on industrial railways, including track, trappers, trucks and skids, portable switches, crossings, turntables, etc.

Plating and Polishing Equipment.—Crown Electroplate & Supply Co., Chicago. Catalog in the form of a sectionalized treatise on the operation of modern plating and polishing departments, including many authentic articles on modern engineering, tables and formulas, etc.

Automatic Excess-Temperature Cut-out.—Hoyt Duty Electric Co., Milwaukee, Wis. Circular describing automatic excess-temperature cut-out used for guarding the furnace against damage from overheating, due to possible failure of the controlling equipment.

Speed Indicator.—Gardner Scientific Corp., 1291 W. 14th Street, Chicago, Ill. Bulletin 122 describes and illustrates a speed indicator with automatic magnetic stop watch, which is said to work in both directions, is not affected

by external forces, and will directly indicate speed from 0 to 6000.

Crushers and Pulverizers.—American Pulverizer Co., St. Louis. Eight-page bulletin illustrating and describing the type "S" all-steel ring crusher. The housings of these machines are of heavy steel castings, reinforced with ribs, thus making them unbreakable by any crushing strain.

Work-Cycle Timer.—Monitor Control Co., Baltimore. Descriptive circular dealing with the Monitor work-cycle timer, an important characteristic of which is that it can be reset instantly at the starting point at any time during, or after, the completion of the cycle.

Analysis of a Materials Handling Problem.—Sherman Corp., 292 Madison Avenue, New York. Circular devoted to an engineering analysis of the operation of the pasting, filling, cutting and shipping department in the Philadelphia plant of Container Corp. of America. Rearrangement of machines, minor building changes and adoption of skid and lift-truck method are dealt with.

Induction Motors.—Reliance Electric & Engineering Co., Cleveland. Bulletin 100 of 15 pages illustrates and describes type AA induction motors, with

ball bearings, for two and three-phase alternating-current circuits.

Electrodes.—Steel Co. of Canada Ltd., Hamilton, Ont. Illustrated folder featuring welded materials, showing testing machines on which the welded specimens are pulled, together with a brief description of the process.

Skid Platforms.—Lewis-Shepard Co., Boston, Mass. Illustrated folder describing four-way skid platforms which are arc-welded. A variety of special-purpose platforms are also illustrated and briefly described.

Conveyor, Air-Draw and Direct-Heat Furnaces.—General Electric Co., Schenectady, N. Y. Three folders of four pages each, illustrating and describing respectively mesh-belt conveyor furnaces, air-draw furnaces for quantity drawing of steel parts at temperatures up to 1200 deg. Fahr., and direct-heat box-type electric furnaces.

Plating Barrels.—Hanson-Van Winkle-Manning Co., Matawan, N. J. Eighteen-page bulletin dealing with the Merrill type Bakelite cylinder, which is applicable to acid solutions, such as nickel, copper sulphate and zinc sulphate, also to strong alkali solutions, such as lye, cyanide, cadmium, cyanide, copper, tin and brass.

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THE IRON AGE—A NECESSARY PLANT TOOL

An accusation commonly made against us Americans by our friends across the water is that we are "magnitude worshippers." "The largest so-and-so in the country." "Covers more ground than any whatzis west of the Mississippi." "Tallest in the State." And so on.

We here in THE IRON AGE have not been guiltless. We are proud of the use made of THE IRON AGE by the industrial mammoths, the country's Fords, General Electrics, U. S. Steels, International Harvesters. Under no bushel have our advertising men hidden the fact that the average financial rating of our subscribing plants is \$442,547 and some odd cents.

But THE IRON AGE is not merely a "big plant" paper. The number of medium-sized and small plants that we serve is legion. THE IRON AGE is useful to any metal-working plant, regardless of size. Lying on our desk, as we write this, is a letter from the proprietor of a Texas shop that makes garden tools. This 11-year user of THE IRON AGE writes:

"I inclose my check for \$6 to pay my subscription for another year. The Iron Age is as necessary in the running of my business as the machine tools in my small machine and forge shops."

—A. H. D.



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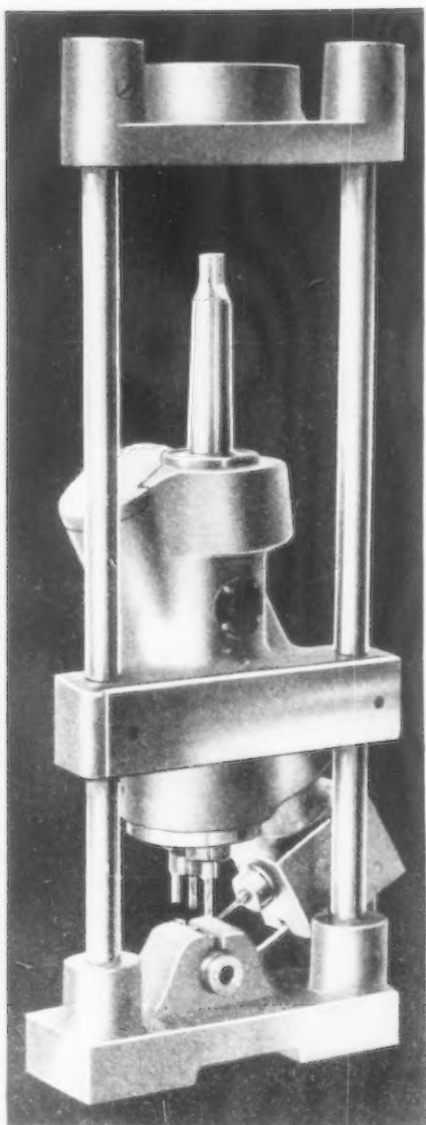
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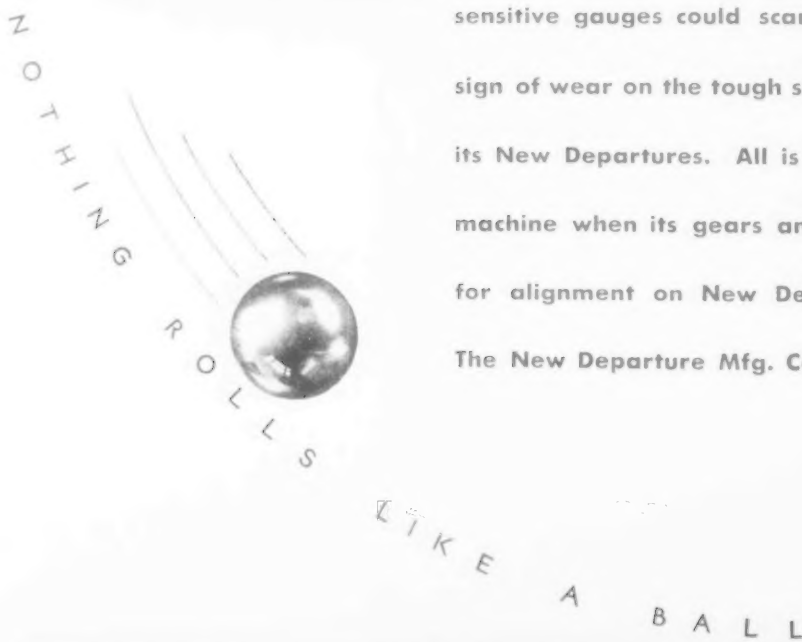
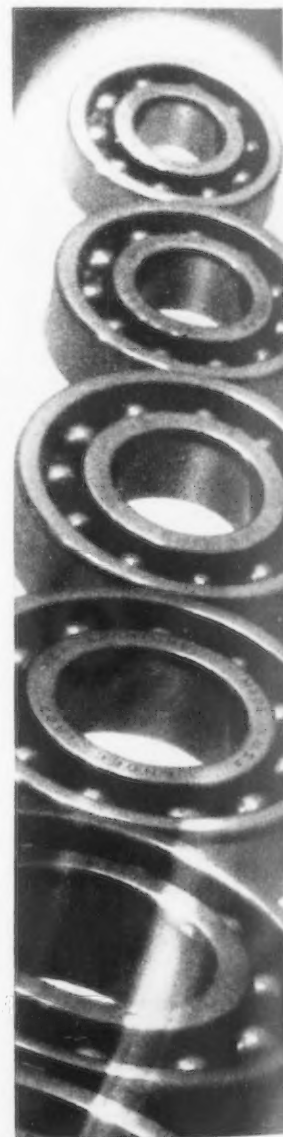
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All is well within . . . New Departures are there

It is a wise manufacturer who makes use of special drilling heads, where conditions permit. And it is a wise drill head builder who makes use of New Departure Ball Bearings. The Sellew Machine Tool Company of Pawtucket, R. I., is the builder of the one shown here. It performs several operations on a door check part, with little effort or cost. Since its spindles are supported by New Departures, they are accurate and rigid . . . smooth and free turning . . . capable of highsPEEDS without over-heating or lubrication troubles. Long after the unit has paid for itself in earnings, the most sensitive gauges could scarcely detect any sign of wear on the tough steel raceways of its New Departures. All is well within any machine when its gears and shafts depend for alignment on New Departures. . . . The New Departure Mfg. Co., Bristol, Conn.



NEW DEPARTURE BALL BEARINGS

THIS ISSUE IN BRIEF

FEBRUARY 12, 1931

Construction Stumbling Blocks

Congress has passed bill permitting preparation of public building specifications by private architects. But sometimes projects are held up by dissensions between political factions as to the kind of materials that shall be used.—Page 531.

Eccentric Bearing Cost Cut

Stock is rolled in strip form with eccentric section. It is then cut into blanks on standard milling machine with special cutters and clamping fixtures.—Page 553.

Flow Idea Is the Heart of Material Planning

In automobile plants, inventories are not split up into several classes (raw materials, materials in process, etc.). All are "productive materials." The reason is that it is desirable to keep materials in a steady flow from receiving docks to shipping platform.—Page 536.

Speeding Up Inventory Turnover

Cutting the processing time increases inventory turnover. One automobile plant turns over its productive material inventory 30 times a year.—Page 536.

When a Design Change Is Proposed

Purchasing agent reports on present stock and cost of new part. Production department checks stock and reports new equipment necessary. Cost department submits final report to general manager.—Page 538.

Conveyors Save 80 Per Cent Floor Space

"Traveling storerooms" keep the stock in process off the floor and carry it to the point where it is needed. Four-fifths of space is dispensed with, releasing foremen, inspectors, route men and supervisors.—Page 541.

Testing Rustless Steels

In making carbon determinations, certain of these highly alloyed steels require the addition of a mixture of fluxes consisting of ingot iron and red lead.—Page 549.

Measuring Carbon Content

Sulphur in rustless steel makes carbon determination more difficult. A \$2.50 trap in the usual train will catch the sulphur fumes.—Page 549.

Push Construction, but Avoid Overbuilding

Every job in construction work creates jobs indirectly for three other people. Cheap materials, low money rates and ample labor are three reasons for accelerating needed new construction, says Col. Arthur Woods.—Page 530.

Tiering Wheels Saves Floor Space

Baking oven has channel slides which guide the rolling wheels at the rim, saving oven floor space.—Page 535.

Material Control Not a One-Man Job

The whole organization must co-operate, production, engineering, purchasing and sales departments.—Page 536.

Bewildering Terminology

Many of the terms used in automatic temperature control have different meanings to different men. There has been little agreement among users and manufacturers of control equipment.—Page 539.

No Wage Cut, but Lower Costs

Fewer rejects, greater uniformity and lower costs result from rearranging electric fan plant around traveling conveyor system.—Page 541.

Old O. H. Bottoms Cause Trouble

Disintegration is proportional to the time the furnace has been cold. If calcium oxide content is low and magnesium oxide content is high disintegration will be negligible.—Page 546.

All-metal Bungalow for \$1,000

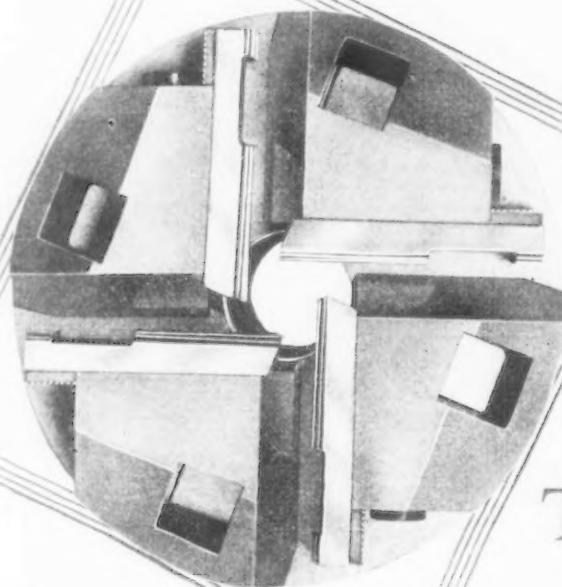
Exterior of German dwelling is copper sheets. Interior is pressed metal. Sections are bolted together.—Page 548.

NEXT WEEK

CAN mass production of consumer goods be overdone to the detriment of a company's profits? Are style changes economically justified as stimulants of mass consumption? One of the several conflicting viewpoints on these controversial questions will be presented in the leading article.

Use of a dust-collecting system to remove cast borings from a machine shop. X-ray inspection of castings and forgings, and measurement of rolling mill pressures are among other features of the issue.

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